Scientific American.

A JOURNAL OF PRACTICAL INFORMATION IN ART, SCIENCE, MECHANICS, AGRICULTURE, CHEMISTRY, AND MANUFACTURES.

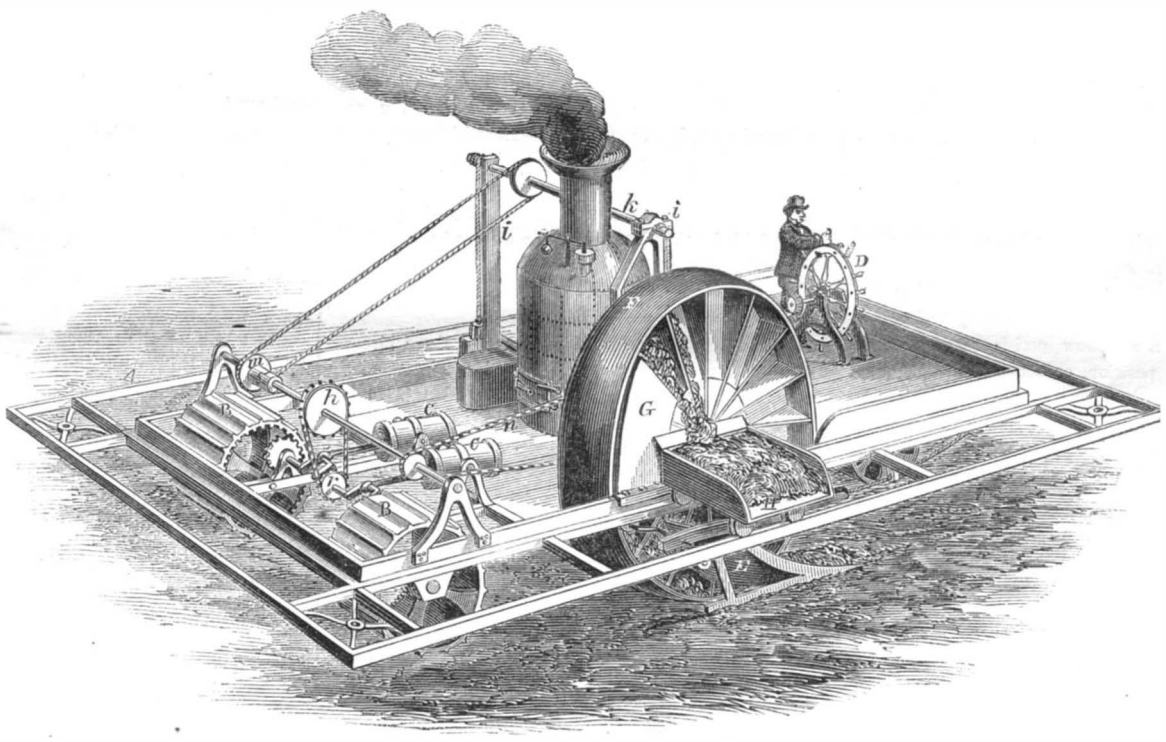
VOL. II.—No. 3. NEW YORK, JANUARY 14, 1860. NEW SERIES.

NEW STEAM EXCAVATOR.

The millions of dollars that are annually expended in excavating earth have attracted the attention of inventors to devise modes of aiding the operation by machinery; and large and costly machines have been made for excavating in certain situations, especially in deep cuts of soft sand, which work well, and perform the labor of many men. In all of the excavators which we have seen, the earth was deposited in carts for removal.

The use of the ponderous machine here illustrated is to excavate earth, and transport it to the desired place of deposit, it being intended to work in ground free from large stones or nearly so, and where the hills are not too steep for the ascent and descent of a locomotive running on broad wheels on the ground.

The rectangular frame, A, is supported on four wheels, two of which, B B, are the driving wheels propelled by the engine, C C. The two forward wheels are joined to the frame by means of a king bolt, and are connected by rack and pinions with the steering wheel, D, so that the machine may be guided in its course. As the machine is driven along, the plow, E, turns up the dirt, and rolls it into the radial chambers of the elevating wheel F. As the wheel, F, revolves, the dirt is held in the chambers by the plate, G, till it is carried above the edge of the plate, when it slides down by its own gravity, and falls into the car, H. The car shown in the cuts is only one of a series intended to surround the machine on a railway having turning tables at the corners; as each car is filled it is pushed along by hand, and thus all receive their loads, when the wheel, F, is raised so that it will not operate to lift the earth, and the machine is propelled under the guidance of the operator to the place of deposit, when the cars are emptied in the usual manner. The shaft of the wheel, F, runs in journal boxes, which are secured in the upright guides, *i i*, and are suspended by chains which are wrapped around the shaft, *k*, so that the wheel, F, may be raised by the power of the engine, by throwing the clutch, *m*, into operation, and thus turning the shaft, *k*. The wheel, F, is rotated by means of the chains, *n* and *o*, and the pulleys, *p* and *r*, as shown.



GOODALE & MARSH'S NEW STEAM EXCAVATOR.

This machine is the invention of W. G. Goodale and R. L. T. Marsh, to whom a patent was issued through the Scientific American Patent Agency, Dec. 20, 1859, and persons desiring further information in relation to it will please address Messrs. Goodale & Marsh, at Centralia, Ill.

THE ART OF TANNING.

The following extracts are taken from the second lecture of the Hon. Gideon Lee, on the above subject, as published in the *Shoe and Leather Reporter*. The substance of his first lecture we published on page 384, Vol. I. (new series):—

"Saving is the order of the day. Each pound of gluten wasted, incapacitated, expunged, consumed, or otherwise lost, involves the loss or prevents the gain of nearly an equal weight of tannin, which the gluten so lost would otherwise have combined. I am satisfied that excessive soaking and softening is the incipient waste. But we must be equally careful to avoid the opposite extreme; for if our theory be correct, short or deficient softening is no less a cause of loss or waste than overdoing. The purest glue and the purest tannin have no more chemical affinity in a perfectly *dry* state than the two most repellant substances in nature. It is only in a state of solution, or extreme softness approximating solution, that this affinity has active existence. Every ounce of the hide, therefore, which fails of that degree of softness requisite for the incorporation or union of tannin is no better than lost; it can never form the necessary union with the tannin in order to make leather; but it must remain in a state which, in technical phrase, we call 'horn' or 'starved hide.' Some tanners have fancied that the opening power of the lime, in the next stage of the process of preparation, may perform what the pure water and the softening mill had left undone. We know that lime is a powerful solvent, and in part it possibly may remedy the defective work of the water and the mill, but not fully. If then, ten pounds of hide in a hundred should fail of the requisite degree of softness, in the harder or thicker parts the leather will fail proportionably, both in weight and quality. The operation of a strong solution of lime, on the soft and raw hide, is powerful, opening the pores, loosening the hair, consuming the fatty particles, and distending and swelling the whole hide to double its natural thickness. It must be obvious to the most ordinary mind that a menstrum so cogent should be used with great discretion; we have good reason to apprehend it has done great waste to our trade in consuming the soft gelatine of which the raw hide is composed. Every tanner knows that all high limed leather is loose, porous, pervious to water, weighs light and wears out quickly; I ascribe the whole mischief in the process to the actual consumption of the soft and more delicate particles of the glutin. Let us suppose that ten pounds in the hundred are thus consumed. Why, we have not only lost the ten pounds of hide, but we have failed to gain the five, or seven, or ten pounds of tannin which should have combined with it! I shall say but little of another process adopted by a great number of our large tanners within a few years, commonly called *sweating;* which accomplishes, by the process of that fermentation natural to all dead animal substances, all the beneficial purposes of the lime; and, I am inclined to believe, with less waste of the raw material. Several practical tanners, in whose judgment I have very great confidence, say, that the sweating process, in comparison with the liming, 'requires less labor saves a portion of the hides, which, in the process of incipient putrefication, would be suddenly destroyed by lime, causes a greater gain in the weight of the leather; that it is more solid, finer texture, less pervious to water, and wears longer; but requires longer time in the tanning, and is very difficult for the shoemaker to sew or stitch.' The process called *bating*, which immediately follows the liming, is intended to expunge the lime and restore the texture of the hide, as nearly as may be, to what it was before the liming process. It is, in its nature, that kind of fermentation which immediately precedes putrefaction, and the ultimate decomposition of all animal substances. This is perhaps the most delicate and critical operation in the whole range of the manufacture of leather, and requires in the operator the nicest perception, the most improved judgment, and constant watchfulness especially in variable weather. The next process is the *handling*. Here begins the actual tanning, in a solution of tannin, which, being a powerful anti-putrescent, instantly arrests the fermentation generated in the bate. I have good reason to believe that, in the *bating* process, a large portion of the substantive body of the hide may be 'run off,' without destroying its organic structure. I presume every reflecting tanner will support me in the

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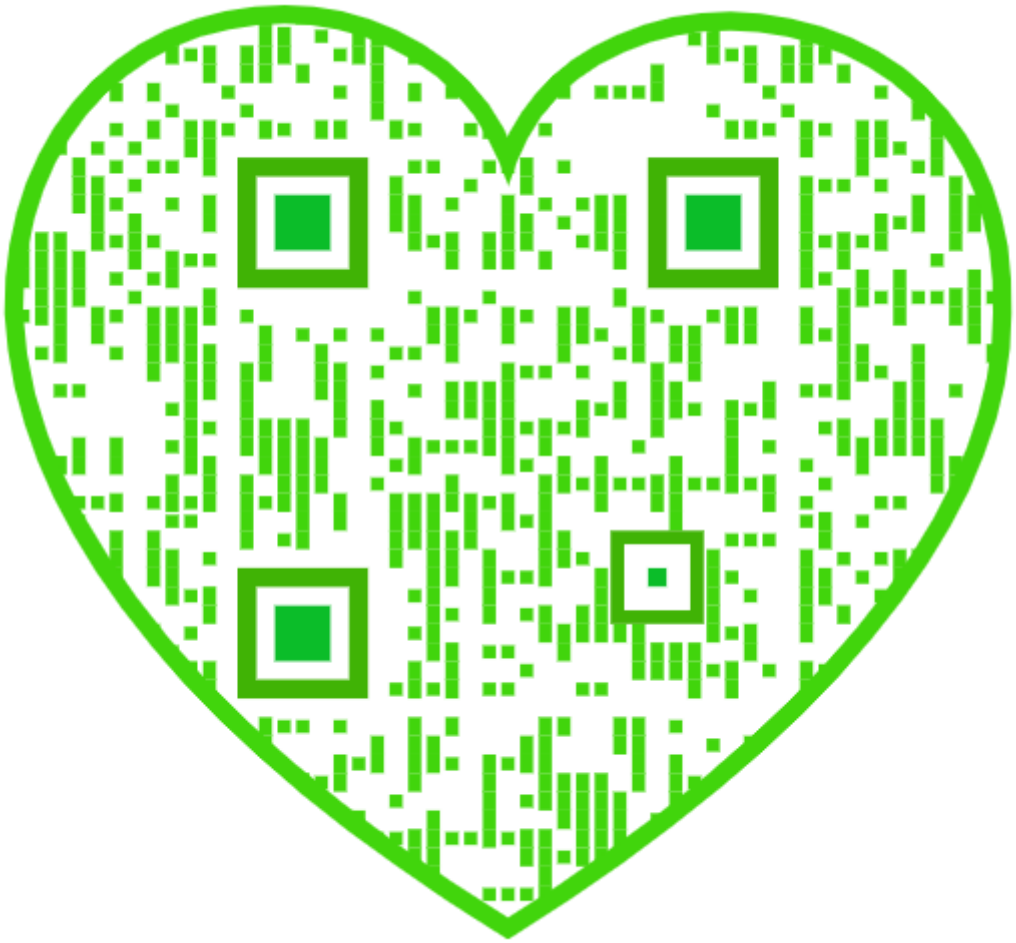

opinion that the waste of glutin, in over-bating, is very great, but I have reason to fear that a greater loss is incurred by means of the *tardy* application of the tannin from the first handler to the last layer, than by all other wasting causes together. I have noticed the results of numerous experiments of both *slow* and *quick* tanning; and in all cases (the preparation of the hide for the ooze being equally well done) have found the *quick* tanned specimens of a firmer and closer texture, more solid, less pervious, vastly greater weight, and far more durable in the wear, than the slow tanned specimens. By *quick* tanning, I mean three to four months for light sole leather; five to six months for middling; and seven to eight months for very heavy; dating from the first handler. By *slow* tanning I mean any considerable additional time to the terms named. I believe a much quicker process might be had, that would give as great or greater weight; but it would render the leather too hard and harsh in its texture to be conveniently worked up by the shoemaker. It will be observed, I am speaking of *sole* leather only, with which kind I am most intimate. The ordinary increase of weight among the large tanners of this State, on the *unsalted dry* hides, imported from Laguira, Angostura, Buenos Ayres, Rio Grande, and other parts of South America (and such chiefly make up their stocks) is such that each one hundred pounds of *dry* hide make one hundred and forty to one hundred and fifty pounds of sole leather. I may also repeat here that, when all the glutin composing the hide is entirely combined (saturated) with the tannin—when the union is perfectly formed—not a single additional ounce can be gained from the strongest ooze, whatever time you continue the process. I had a most satisfactory experimental proof of the correctness of this conclusion. I consider active and long-continued handling vastly important, not only in the acquisition of weight, but in point of firmness and durability. I would handle sole leather from eighty to one hundred and twenty days, according to the weight of the sides, and the subsequent *laying away* should be short and frequently repeated; a few days only for each layer, and in no case more than two-thirds the quantity of sides which is usually laid in each vat. I have ascribed the greatest loss or waste in glutin to the *tardiness* of the *tanning* stage of the manufacture. I am not able to satisfy my own mind precisely how or when it goes; I am rather inclined to think it does not separate and escape from the body of the hide, as in the process of softening and bating; but for want of an immediate conjunction with the tannin, I believe it somehow perishes, and becomes extinct in its original position, or becomes incapacitated ever thereafter to form the necessary union with the tannin. If these conjectures be well founded, then much handling will prove the best remedy. I believe that the glutin of the interior parts of the hide chiefly suffers this disqualification; for the exterior being brought into immediate contact with the tannin, the two surfaces are always first tanned, as every body knows. And it is somewhat curious to see the progress of the combination extending from the two surfaces inward—the interior remaining colorless, soft, raw hide, for months after the two surfaces have become firm, well-tanned leather; the glutin of the two surfaces having arrested and combined all the tannin before it reaches the interior."

The opinions of Mr. Lee, regarding the experiment of quick-tanned hides, are the very opposite of those generally entertained by almost every person *outside* of the tanning business.

DRAINAGE OF CITIES FOR MANURES.

A very valuable letter has lately been written by Professor Liebig, the eminent chemist at Munich, in Bavaria, to Mr. J. J. Mechi, the well-known enterprising English agriculturist, in answer to a letter of the latter, which had been published in the London *Times*. We will give the substance of this letter, and request for it a careful attention, as the opinions expressed, and the information contained in it, are just as important to the citizens of all our large cities as to the inhabitants of London.

In reference to the use of sewerage matters for manures, he says:—I regard it as a fortunate event that a man of so eminently practical a character as yourself has now for the first time, in the interest of agriculture and the national welfare, taken up the question of the "sewerage of towns" with warmth, and in language adapted to produce conviction. I have labored many years to impress such views upon the public, but my efforts have not been attended with any perceptible results. The men to remove the difficulties which stand in the way of procuring manure from the "sewerage of towns" will certainly be found; and a future generation will look upon those men who have devoted their energies to the attainment of this end, as the greatest benefactors of their country.

The ground of my small success lies clearly in the fact, that the majority of farmers do not know the extent to which their own interests are concerned in this matter, and because the views and conceptions of most men in regard to the circuit of life and the laws of the preservation of our race, do not generally rise above those of C. Fourier, the inventor of the phalanstery. He proposed, as you know, to supply the wants of the occupants of his phalanstery by means of eggs. He supposed it was only necessary to procure a couple of hundred thousand hens, each of which would lay thirty-six eggs a year, making as many millions of eggs, which, sold in England, would produce an immense income. Fourier knew very well that hens lay eggs, but he seemed not to know that in order to lay an egg they must eat an amount of corn its equal in weight. And so most men do not know that the fields, in order permanently to yield their harvests, must either contain, or else receive from the hands of man, certain conditions which stand in the same relation to the product of the fields as the hen's food does to the egg she lays. They think that diligent tillage and good weather are sufficient to produce a harvest; they therefore regard this question as one in which they are wholly unconcerned, and look forward carelessly and with indifference to the future.

It is true that the diligent tillage of the fields, sunshine, and timely rain, are the outward conditions, perceptible to all men, of good harvests, but these are perfectly without effect upon the productiveness of the field, unless certain things not so easy of perception by the senses are present in the soil, and these are the elements which serve for nourishment—for the production of roots, leaves and seeds—and which are present in the soil always in very small quantity in proportion to the mass of the soil itself.

These elements are taken from the soil in the products of the field, in the corn, or in the flesh of the animals nourished by these products, and daily experience shows that even the most fruitful field ceases after a certain series of harvests to produce these crops.

A child can comprehend that, under these circumstances, a very productive field, in order to remain *very* productive, or even simply productive, must have the elements which have been withdrawn in the harvests perfectly restored; that the aggregate of the conditions must remain, in order to produce the aggregate results, and that a well, however deep it may be, which receives no supply of water, must in the end become empty, if its water is constantly pumped out. Our fields are like this well of water. For centuries those elements which are indispensable to the reproduction of the field crops have been taken from the soil in those crops, and that, too, without being restored. It has only recently been ascertained how small a supply of these elements the soil really has. A beginning has been made to restore to the fields the loss which they sustain through the annual harvests, by introducing from external sources manures containing the same elements. Only a very few of the better-informed farmers perceive the necessity of this restoration, and those of them who have the means have zealously endeavored to increase the amount of these elements in their fields.

The loss of these elements is brought about by the "sewerage system of towns." Of all the elements of the fields, which in their products in the shape of corn and meat, are carried into the cities, and there consumed, nothing, or as good as nothing, returns to the fields. It is clear that if these elements were collected without loss, and every year restored to the fields, they would then retain the power to furnish every year to the cities the same quantity of corn and meat; and it is equally clear that if the fields do not receive back these elements, agriculture must gradually cease. In regard to the utility of the avails of the "sewerage of towns" as manures, no agriculturist, and scarcely an intelligent man, has any doubt; but as to their necessity, opinions are very various. Many are of the opinion that corn, meat, and manures are wares which, like other wares, can be purchased in the market; that with the demand the price may perhaps rise; but perhaps in half a century not one of those countries upon whose excess England has hitherto drawn, will be able to supply her with corn, and that too, from the natural law, that what is true of the smallest piece of ground is true also of a great country—it ceases to produce corn if the conditions of the reproduction of the corn which has been carried off are not restored to it.

In the United States the population increases at a still greater ratio than in other countries, while the corn production upon the land under cultivation has constantly fallen off. History teaches that not one of all those countries which have produced corn for other lands have remained corn markets, and England has contributed her full share towards rendering unproductive the best lands of the United States, which have supplied her with corn, precisely as old Rome robbed Sardinia, Sicily, and the rich lands of the African coast of their fertility.

Finally, it is impossible in civilized countries to raise the corn production beyond a certain limit, and this limit has become so narrow that our fields are no longer capable of a higher yield without an increase of their effective elements by the introduction of manures from abroad. By means of the application of guano and bones, the farmer of most limited capacity learns the real meaning of such increase; he learns that the pure system of stall or home-made manures is a true and genuine robbing system. In consequence of his restoring in the guano and bones but a small portion of the very same elements of seeds and of fodder which had been withdrawn from his fields by centuries of cultivation, their products are wonderfully increased. Experiments instituted with special reference to this end, in six different parts of the kingdom of Saxony, showed that each hundred weight of guano put upon a field produced 150 lbs. of wheat, 400 lbs. of potatoes, and 280 lbs. of clover, more than was produced by the same-sized piece of ground without guano; and from this it may be calculated how enormously the corn and flesh production of Europe has been increased by the yearly importation of 100,000 tuns, or 2,000,000 cwt. of guano.

The effect of guano and bones should have taught the farmer the real and only cause of the exhaustion of his fields; it should have brought him to perceive in what a condition of fertility he might have preserved his fields, if the elements of the guano which he has transported in the shape of meat and products of his fields into the cities, were recovered and brought into a form which would admit of their being restored every year to his fields. But it is much simpler, he thinks, to buy guano and bones, than to collect their elements from the sewers of cities, and if a lack of the former should ever arise, it will then be time enough to think of a resort to the latter. But of all the farmers' erroneous opinions, this is the most dangerous and fatal. If it is considered that a pound of bones contains in its phosphoric acid the necessary condition for the production of 60 lbs. of wheat; that if the English fields have become capable, by the importation of 1,000 tuns of bones, of producing 200,000 bushels more of wheat in a series of years that they would have produced without this supply, then we can judge of the immense loss of fertility which the German fields have sustained by the exportation of the many hundred thousand tuns of bones which have gone from Germany to England. It will be conceived that, if this exportation had continued, Germany would have been brought to that point that she could no longer have been able to supply the demand of her own population for corn. In many parts of Germany, from which formerly large quantities of bones were exported, it has already come to be the case that these bones must, at a much higher price, be bought back again in the form of guano, in order to attain to the paying crops of former time. The price of bones is now so high in Germany as to forbid their exportation.

In relation to guano, I have been assured that in 20 or 25 years, if its use should increase in even the same proportion as hitherto, there will not remain in South America enough to freight a ship. We will, however, suppose its supply and that of bones to continue for fifty years, or even longer—then what will be the condition of England when the supply of guano and bones is exhausted? This is one of the easiest of all questions to answer. If the common "sewerage system" is retained, then the imported manures, guano and bones, make their way

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into the sewers of the cities, which, like a bottomless pit, have for centuries swallowed up the guano elements of the English fields; and after a series of years the land will find itself precisely in the condition it was in before the importation of guano and bones commenced. A very little reflection will lead to the conviction that the relations of populations are governed by a great and comprehensive natural law, according to which the return, duration, increase or diminution of a natural phenomenon depends upon the return, duration, increase, or diminution of its conditions. This law governs the return of the harvest upon our fields, the maintenance and increase of the population, and it is easy to see that a violation of this natural law must exert upon all these relations a pernicious influence, which can be set aside in no other way than by the removal of its causes. If, then, it is known that certain existing relations work deleteriously upon the fields, it can be foreseen that their continuance must bring about the ruin of agriculture.

It has been maintained that the recovering of the manure elements out of the sewers in the large cities is impracticable. I am not ignorant of the difficulties which stand in its way—they are indeed very great; but if the engineers would come to an understanding with the men of science in relation to the two purposes—the removal of the contents of the sewers, and the recovery of their valuable elements for agriculture—I do not doubt that a good result would follow. Intelligence, in union with capital, represents a power in England which has rendered possible and practicable things of much greater apparent difficulty. I look forward with deep concern to the solution of the "sewerage question." For if this question is decided in Great Britain without regard to the wants of agriculture, we can scarcely hope for anything better upon the continent.

Countries may be fruitful, and become capable of sustaining a large population, when certain resisting influences, which in their unimpeded working make the cultivation of the soil impossible, are overcome by human intelligence; or when a land has all the conditions of productiveness except one, and then receives the one which it lacked. If Holland were without her dikes, which must be kept up at great expense, she would produce neither corn nor meat; the land would be uninhabitable. In a similar manner the inhabitant of the African oasis protects his grain fields by dikes against the storms of the desert, which cover his ground with a barren sand. I know that the prophets of future evil have at all times been derided by their own generation, but if history and natural law can furnish any ground whatever for a just conclusion, then there is none which stands upon a firmer basis than this: that, if the British people do not take the pains to secure the natural conditions of the permanent fertility of their land—if they allow these conditions, as hitherto, to be squandered, their fields will at no distant day cease to yield their returns of corn and meat.

CALIFORNIA WINE.—The Sonora *Aye* gives the following information relating to the wine manufacture in that place:—"At Moussaud's vineyard, near the foot of Bald Mountain, they are pressing nearly their entire crop, and have 1,500 gallons of white wine already made. They will make 4,000 gallons in all. Mr. Peltret has made 500 gallons of excellent wine, and has still a lot of grapes on hand, preserved for table use. Madame St. Cyr makes 500 or 600 gallons of wine; and about the same quantity will be made by Madame La Carce. Uncle John Moss has made 160 gallons of excellent red wine from 1,837 lbs. of grapes. Besides the wine thus manufactured from the grape, some brandy and a large quantity of vinegar will also be made. It will be seen, from the figures given, that very nearly 6,000 gallons of wine will be produced this season by a few small vineyards in the vicinity of this town. This will readily sell from $2 to $2.50 per gallon, which, at the lowest figure, will net $12,000 for the whole."

LIQUID GLUES.—Dissolve 33 parts of best (Buffalo) glue on the steam bath in a porcelain vessel, in 36 parts of water. Then add gradually, stirring constantly, 3 parts of aqua fortis, or enough to prevent the glue from hardening when cool. Or dissolve 1 part of powdered alum in 120 parts of water, add 120 parts of glue, 10 of acetic acid and 40 of alcohol, and digest.—*Druggists' Circular.*

TESTIMONIAL FROM AN INVENTOR.

GENTLEMEN:—I was at last compelled to employ you as agents to "fix up" my re-issue papers for a sugar evaporator; and I must say it is well done, and would have saved much difficulty if I had employed you to attend to my case in the first instance. I am not sure but that my present application for an improvement in ———— will have to be fixed up by your firm yet. Respectfully, D. M. COOK.

Mansfield, Ohio, Jan. 6, 1860.

[The above gentleman prepared his papers for a re-issue, and attempted to act as his own attorney. The consequence was, he got his case in such a "fix" that it was difficult, for a time, to determine where to begin to straighten them so as to get them in condition for the action of the Patent Office. But it was done, as seen by the inventor's statement above, and done to his apparent satisfaction.

While we recommend all inventors who are competent to prepare their own drawings and specifications and act as their own attorneys before the Patent Office, we counsel those who have had no experience in such business, and have an invention worth protecting by a patent, to employ some experienced attorney to act for them from the first—not to wait until they get their case in such a condition as to require more labor and expense to amend it than it would have cost in the first place to have had the business well attended to. The preventive of trouble is cheaper than the cost of cure in such cases, as the writer above can testify.—EDS.

DISCOVERIES AND INVENTIONS ABROAD.

Substitute for Chloroform.—A considerable sensation has just been produced in Paris by M. Velpeau, an eminent surgeon, who has recently communicated to the Academy of Sciences the extraordinary fact that, if a brilliant object (such as a red bead) is placed near to the face of a person and between the eyes, and the gaze be fixed steadily upon it for a few minutes, the person will soon fall into a cataleptic state and become as insensible as if under the influence of chloroform. M. Rocco is stated to be the discoverer of this, and in making several experiments, persons were made to undergo surgical operations quite unconscious of pain. A correspondent of the Boston *Traveler*, writing from Paris, seems to be enthusiastic on this discovery, and recommends its practice by the dentists of Boston in extracting teeth. We remember very well how this alleged new discovery was discussed in both the English and American papers about 20 years ago, as an explanation of the phenomena of animal magnetism and the cataleptic condition into which some persons may be easily thrown. It never can be used with certainty in surgery, in all cases, although it may be in some.

Red Dyes.—A patent has been taken out in England by R. A. Brooman (as a communication from abroad) for the preparation of red colors for textile fabrics from aniline. A mixture of aniline and anhydrous bichloride of tin are first heated up together to the boiling point and then boiled for fifteen minutes. At first the mixture is of a yellowish tint, but it finally becomes a beautiful red when held up to the light, although, in a very large quantity, it appears to be of a blackish crimson color. When hot, the liquor maintains its liquid condition; but on becoming cold, it assumes a jelly state. While still warm, the liquor is to be filtered to free the coloring matter from several impurities. By adding the tartrate of potash or the acetate of lead to the liquor while hot all the coloring matter is precipitated, and when it becomes cold it may thus be obtained solid, to be used like the extract of logwood in dyeing. The red solution of aniline thus obtained may be used with pyroligneous mordant, or the nitrate and acetate of lead in dyeing. To print calicoes with this preparation of aniline a very concentrated extract is required, which is mixed with dextrine or gum to make it into a printing paste. Acetic acid and alcohol will also precipitate the extract. The bichloride of mercury (corrosive sublimate), the protochloride of copper and the perchloride of iron can also be employed to mix with the anyline as substitutes for the bichloride of tin.

Aniline Blues, Lilacs and Drabs.—A patent has also been lately secured by Messrs. J. T. Beale and T. N. Kirkham, of England, for aniline in dyeing and printing. This invention consists in treating salts of aniline, or an acid solution of it, with hypochlorite of lime or common bleaching powder, to obtain fast colors. They take the nitrate of aniline, or the acetate, or a saturated solution of aniline in water, and add an equal quantity by measure of acetic acid. To this solution some hypochlorite or bleaching powder is also added, and a change in the color of the solution at once takes place. The shade of the liquor indicates the shade of color to be produced by it on textile fabrics. By varying the quantities of these substances different shades may be produced, from a blue to a lilac, purple, violet, slate and drab. It is well known to dyers that, by using the same substances in dyeing (only in different quantities—strong and weak), browns, drabs, &c., are colored; and so it is with using aniline of different degrees of strength, according to the shades desired. When preparing analine for dyeing, the chlorite must be added very cautiously until the proper shade is attained, because it is the re-agent which "tones" the colors. The following is the method of practically using the aniline:—Dissolve as much aniline as can be taken up in a certain quantity of water—say one gallon, and to this add one gallon of strong acetic acid and a pint of the hypochlorite of lime. The whole is then carefully stirred and the color of the liquor becomes a violet of an intensity proportioned to the amount of chlorine used, the greater the quantity of the latter the lighter the shades produced. According to the quantity of hypochlorite used, the shades of aniline will vary from a violet to a drab. With aniline liquors thus prepared, silk may be dyed various shades without mordants; with mordants, both wool and cotton fabrics may be dyed with the aniline thus prepared; and strong extracts may be employed for printing. We had been informed that aniline—which is a preparation of indigo with dilute nitric acid, and formerly called indigotic acid—had gone out of use, but these two patents afford evidence of it becoming more extended in Europe. None of these colors, so far as we know, have yet been introduced into this country.

Increasing the Strength of Paper.—We described a method of producing vegetable parchment on page 237, Vol. XIV. (old series) of the SCIENTIFIC AMERICAN, by steeping unsized paper for a brief period in sulphuric acid, slightly diluted. We learn from our able cotemporary, *Newton's London Journal of Arts*, that another method of producing vegetable parchment has been discovered and patented by Mr. T. Taylor, London. Paper—either sized or not—is taken dry and soaked in a concentrated neutral solution of chloride of zinc moderately heated; after which it is washed, dried and is ready for use, having the strength and appearance of parchment. The neutral solution of the chloride of zinc is formed by adding the carbonate or oxyd of zinc to a solution of zinc dissolved in muriatic acid, then evaporating the solution until it has arrived at the consistency of sirup when cold. In this state it has a high specific gravity, and the paper to be treated is immersed in it for a few minutes, then taken out, and the adhering zinc removed by a scraper. The paper is now thoroughly washed in clean cold water and afterwards pressed and dried. This treatment draws or *fulls* the fibers of the paper together, rendering the sheets smaller in size but much stronger and closer in the texture. The process described is conducted with cold liquors, and the paper is only partly rendered into vegetable parchment; when it is desired to produce the fullest change possible in the paper, the liquor is kept heated about 120° Fah. while the paper is immersed in it. Sheets of paper, when saturated with such a solution, may be joined permanently together by uniting their edges and passing a heated iron over them. The chloride of tin may also be used as a substitute for the zinc. Paper treated in this manner becomes much thicker, and can be glazed with a most beautiful surface.

Refining Sugar.—In introducing raw sugar for the purpose of refining, it is liable to sink down and come in contact with the heated steam pipes in the melting pan, whereby some of it is carbonized and more molasses produced than otherwise would be. To avoid this a patent has been taken out by Mr. John Aspinall, of London, for melting the raw sugar before it comes in contact with the steam pipes of the open heating pan; and he does this by placing the sugar upon a perforated false bottom which just comes in contact with the surface of the water in the pan, and dissolves it gradually before it can be precipitated to the bottom. The idea embraced in this invention is to melt all the raw sugar in the liquor before it can come in contact with the pipes which heat the pan.

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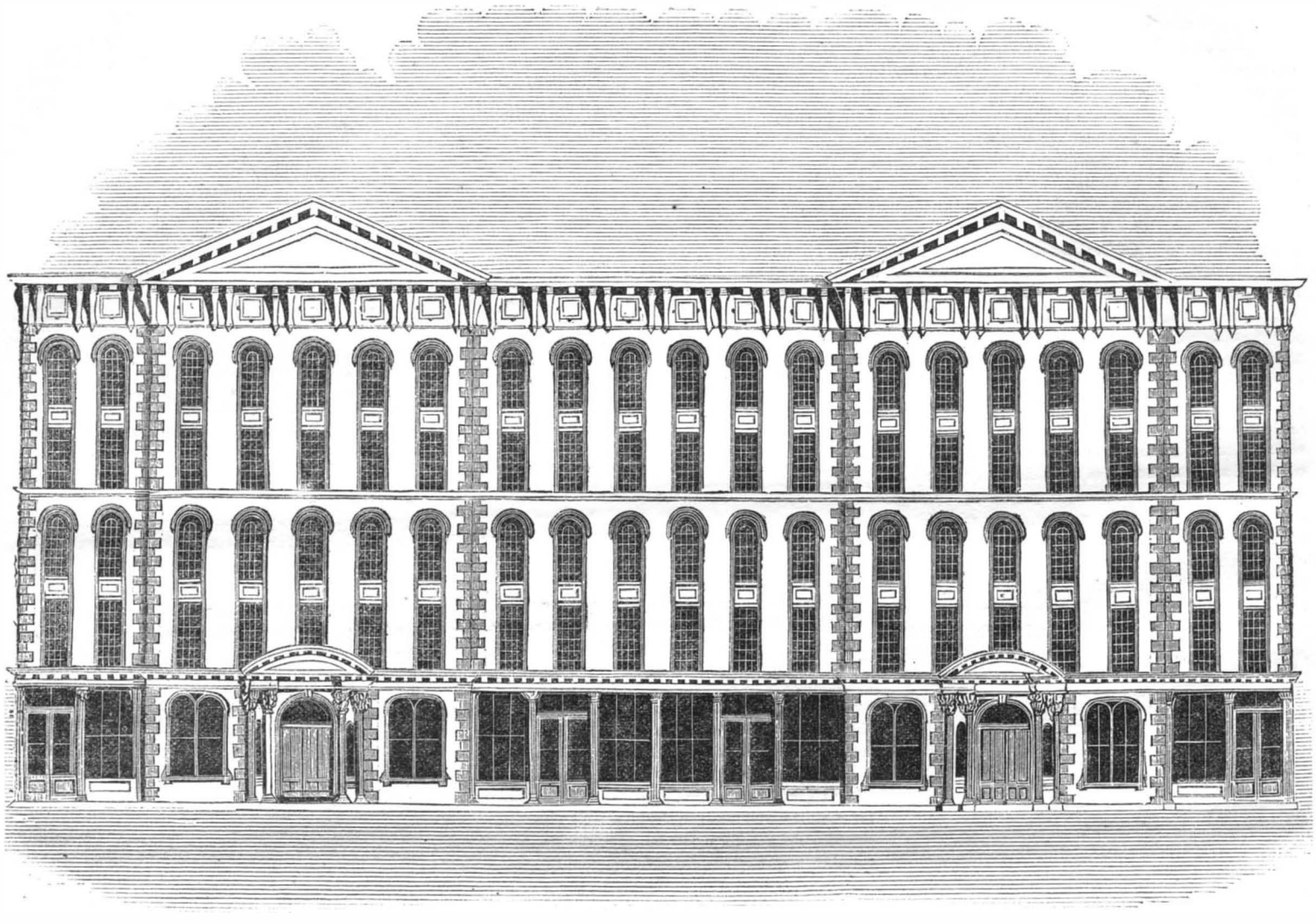


THE NEW YORK PALACE HOME—FRONT ELEVATION.

MAGNIFICENT BUILDING SCHEME—PRACTICAL PLAN FOR REDUCING RENTS.

Is it possible in large cities to have comfortable, convenient, and genteel dwellings at a rent of $140 to $250 per annum, to reduce the expense of servants, and all other costs of living nearly or quite one half, and to combine the conveniences and freedom of the best hotels—if not their elegancies—with all the seclusion and retirement of private houses? Some shrewd business men answer these most important and interesting questions in the affirmative; and they say that a building nearly half a mile in circuit will soon be going up in this city to demonstrate the truth of their statements. The plan is to buy a block of ground in the neighborhood of the Central Park, 200 feet by 800 in size, extending from avenue to avenue and from street to street, and to cover the whole with one immense hotel for the occupation of private families. It is proposed that the occupants shall own the property, and have control of the management.

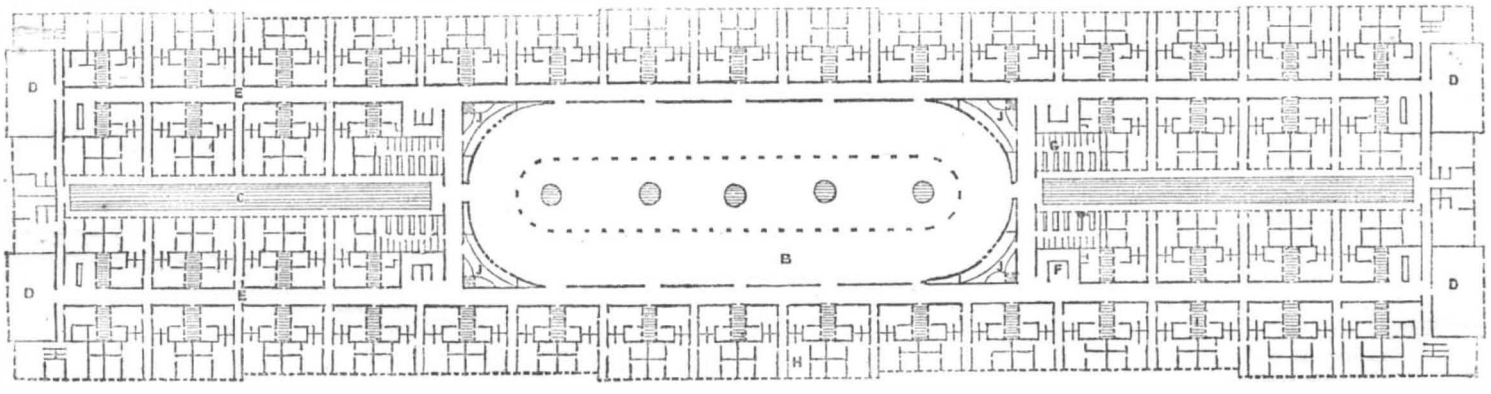
The amount of money requisite to complete the edifice and place it in working condition is $1,000,000, according to estimates accurately made. One-half this amount may be obtained from bonds paying 7 per cent interest secured upon the property. The other half is to be apportioned among the stockholders.

Each room or suite of rooms in the edifice will vary in value from $400 to $2,000, according to size and position. It will require, to complete the building, a thousand subscribers, averaging $1,000 each, who will have five years' time over which to arrange their payments, whilst during three out of these five years they may be at the same time tenants, having their rent paid out of their stock dividends. It is proposed not to take any subscription for a less amount than a sum equal to the value of a room or suite of rooms. A single man or woman who in this way secures a room at $500 will have a permanent home for the interest on that sum, which is $35 per year, at seven per cent, or $30 at six per cent, and with this home will be connected the advantages already enumerated. This point will be made more distinct in the by-laws of the association; these will provide that each suite of rooms be appraised and numbered in a manner similar to that adopted for church pews; each subscriber to take stock enough to cover the appraised value of such rooms as he selects; the payments on the stock to be extended over a period of five years, and the stock itself to be lodged with the executors of the association as security for fulfillment on the part of the tenant of the conditions of the lease; these conditions to provide for a proper observance of order.

It will be seen by our illustrations that the movement is so far advanced that plans of the building have been prepared. We present a view of the front, and a plan of the second story, with a full description of the whole.

The basement will be occupied by a kitchen and laundry in the center, to cover a space of 300 by 100 feet, lighted from the top by five domes, each 16 feet in diamter. Its hight will be 15 feet; it will be constructed thoroughly, and ventilated by a system adapted to carry away all odors arising from culinary operations, and generally it will be supplied with every well-tested improvement applicable to cooking on a large scale by systematic methods. The space beneath the sidewalks on the streets and avenues will be appropriated for storehouses, fuel depots, machinery for grinding and otherwise preparing food; a pumping engine, bakery, boilers, steam engine, ice-house, and gasometer. The remainder of the space will be occupied with workshops, of which there may be forty-six in number, 42 feet square each, lighted from the top by glass domes, 26 feet by 7, this being the size of the forty-six areas, which serve also to admit air and light to all the interior portions of the building.

The ground floor will be covered with a garden in the central court, 240 feet long, by 28 feet wide, oval shape, around which will be built a hall or gallery of iron and



PLAN OF THE PALACE HOME—SECOND FLOOR.

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glass, two stories in hight. The first story, 20 feet high, will be divided into a music and lecture-room, 220 by 30 feet, shape nearly semi-circular. The reading-room and library will be of the same shape. The dimensions of the parlor will be 180 feet by 30; the natural history room and picture gallery will be 90 feet by 30; and the smoking-room will be 90 by 30; all of these may be united if desired. On this floor will be a number of stores and offices, say, at least, seventy, varying in size, but averaging about 20 feet by 45, with entrance from the interior arcade, as well as from the street. There will be located the business offices, two in number, 28 feet by 24 each, and four more of like size for janitors and stewards. Space will be reserved for a chapel, 100 feet by 24; for four vestibules, 20 feet by 26 feet, and six hall entrances 45 feet by 9 feet; two schoolrooms, 75 feet by 24; and sixty suites of rooms for families who may be in the city temporarily to visit friends residing within the edifice. From this floor to the upper story will ascend eight broad stairways, and four steam elevators will be in constant operation to serve those who prefer this mode of ascent over the more laborious one by stairways. On this, as on each other floor, ample provision will be made for water-closets and bathing-rooms, and every suite of rooms will be supplied with a faucet for water and a waste-pipe.

In the annexed plan of the second floor of this gigantic "palace of the people," A represents a court-yard, 280 feet long by 28 wide, with five glass domes to light the kitchen, which is located in the basement. B indicates an oval building constructed of glass and iron, two stories high, surrounding the court-yard; the first story will be divided into a number of public rooms, and the second will be used as a grand dining hall. Above the second story both A and B combine to form another and larger court-yard, 300 feet long by 100 wide; the marginal portion (built over the roof of the dining-hall) is to be used as a conservatory, and the central portion will be adorned with a grass plot and fountains. C is an oblong area designed to convey light and air to such rooms as have windows opening on the same; the rooms on the first story are to be appropriated for offices, schoolroom and chapel. Another similar area is visible in the other wing of the edifice. In each wing are also seen two parlors for general use, D D; the location of these will be changed to the center of the front, and each pair will be united into one apartment, 92 feet long by 26 wide. E E are two corridors, each 9 feet wide, intended to eventually extend from one end of the building to the other, and to pass through those portions now occupied by the rooms, D D, in order to secure thorough ventilation. F indicates a steam elevator and stairway; the former being for the use of invalids and others desiring a mode of ascent easier than the usual means; there are four of these, and also four other stairways, one near each of the parlors, D. The water closets and bathing rooms (of which there are four sets) are marked G. H represents various suites of rooms, comprising, in most cases, one parlor and two sleeping rooms; each of the latter containing a couple of closets. Every suite has four windows fronting on the street, and one (in the rear chamber) opening on an area, 26 feet by 7; there are, in all, 46 areas, which, in the annexed plan, are shaded to distinguish them from apartments. There are 186 suites on this floor, but some changes are to be made in the size and structure of the rooms. J, J, J, J, are four steam elevators for hoisting cooked provisions from the kitchen to the dining-hall, together with flues for carrying away the steam and odors from the kitchen.

On the second floor the dining room will be located. This will be a half-oval shape, 22 feet high, located over the music and reading rooms, covering a space 800 feet by 30, lighted from the side and top. Meals will be served here three times daily, on the European plan, the American plan (or *table d'hote*), and after the manner of the English club houses, so that families may choose between these, or have their meals in their own apartments if they prefer. This department will be in the hands of an experienced manager, under whom will be secured thorough neatness in the serving as well as cooking of the food. Also it is intended to introduce a system which shall effectually do away with opportunities for dishonesty, even on a small scale. The food will be pure and fresh, and will be served at prices far below that now paid by housekeepers. As an illustration may be cited the price and quality of milk, which can be supplied pure and fresh for 3½ cents per quart, throughout the year; eggs at 15 cents per dozen; and butter at 15 cents per pound, from farms and dairies conducted, organized and kept expressly to furnish these supplies. This floor will also contain four parlors for general use, each 46 feet by 26, and the remainder of the space will be appropriated for single rooms and suites; the single rooms varying in size, but occupying about 20 feet by 12; the suites containing two or more rooms, averaging 20 feet by 12, for the parlor or sitting room, and 12 feet by 10 for the sleeping rooms.

The other four stories will be divided in the same manner, except that the central area will be 300 feet by 100, and as there is to be a conservatory on the roof of the dining hall, 800 feet by 30, the top of this area will be covered with glass during the winter season.

The hight of the rooms will be each about 15 feet on the first floor, 14 on the second, 13 on the third, 12 on the fourth, 11 on the fifth, and 10 on the sixth. Ventilation will be so thorough that every room can have a stream of pure air from without, with facilities to expel impure air at the will of the occupants.

The building will be rendered thoroughly fire-proof throughout. The use of iron girders and iron beams, with brick arching for the floor to rest upon—put in the place of the ordinary wood beam, joist and plank—prevents the possibility of danger in this respect. Every room in the edifice will be heated from apparatus centering in the basement; and each room will be lighted with gas. Efficient heads to the several departments will be obtained, that the order and system necessary to an organization of this character may be preserved.

Among the marked advantages which promise to grow out of this enterprise may be enumerated:—

1st. A family will obtain, for $1.50 per week, or $75 per year, a better home than can now be obtained in any part of New York city, for $250 per year, and the location of this edifice will be the best the city affords. A single man or woman, who now pays an average of $2 per week for an attic chamber, will have a better room for 75 cents per week. The difference between these prices will, in five years' time, pay for a sufficient number of shares to secure a *permanent* home.

2d. By the terms of arrangement for payments, it is within the reach of persons of very moderate circumstances to become shareholders; and when their shares are once paid for, the dividend thereon will pay their rent, which is tantamount to living rent free. In other words, the tenant becomes his own landlord, and the body of tenants choose their executives from among their own number.

3d. Servants may, to a considerable extent, be dispensed with; also the care of stoves, fires, ashes, back doors and barred windows, ash barrels and offal tubs, cockroaches and Croton water pipes, gas and fuel bills, grocers' and butchers' books, milk accounts, diseased children from the use of impure and unclean milk, door bells, beggars, burglars, hall thieves, kitchen thieves, rats and mice.

4th. The economy in expense for food will be to the extent of about one half the cost under the present system; an estimate carefully made, and based upon experiments made expressely to ascertain these points, proves that a family of four persons may live upon the ordinary run of hotel fare at an expense of about $12 per week, rent included.

Young men and young women, who find but inferior accomodations in boarding-houses, may here enjoy many home comforts which at present are denied them. The condition of children will become elevated from their present routine. Danger from fire may be averted; and in insurance alone, the economy will exceed $50,000 per year in the aggregate—a fact proved by calculations already made.

A suitable number of watchmen will be employed to guard the building by day and night.

The schools and gymnasiums for the children will be located in an eligible part of the building, adjacent to which will be an extended play-ground promenade in the open air.

More than one hundred individuals have already signified their wish to become regular inmates of this edifice.

Any further information in relation to the enterprise may be obtained by calling at the rooms (Nos. 13 and 15) of the association, in Appleton Building, 346 Broadway, this city.

FRESH AIR IN RAILROAD CARS.

The Court of Massachusetts has lately been called upon to decide a case arising out of a passenger persisting in letting a draught of fresh air into a railroad car against the wishes of the other passengers. The conductor remonstrated, and put the window down; the passenger broke the glass, and got ejected from the car. He brought suit for damages, and got $5, the price of the ticket; the Court ruling that the railroad company had a remedy by law against the passenger for destruction of property, and could not put him out except for persistent violation of the rules of the company. The New York *Journal of Commerce* reports a case nearly similar, in which a lady refused to close a window, though requested by an elderly gentleman, who sat on the next seat to her. The *Journal* remarks:—

"The comforts of railway passengers depend more on the courtesy and politeness of the parties than upon mere abstract legal rights. A proper regard for their convenience and of others will prompt either gentleman or lady to conform to their wishes in all ordinary circumstances, but if any are so rude as to refuse this, it is far better to allow them the enjoyment of their perverseness than quarrel over it. And when there is a lady in the case, the only prudent course is to surrender at once."

A better expedient than any mentioned by the *Journal* is for railroad companies to compel their employees to pay proper attention to the heating and ventilation of cars, after having provided the best facilities therefor. At present these important matters are left almost to chance, and cars are too frequently at an oven heat a portion of the time, and during the rest the atmosphere is of an Arctic frigidity.

Again and again have we directed attention to the necessity of properly heating and ventilating our railroad cars, and yet no good method has been adopted generally by our railroad companies. It is not because there are not efficient systems of heating and ventilation known, for several good plans have been brought before the public through our columns, but it is because there is such a conservative spirit prevailing in regard to old adopted systems, that changes are resisted even though founded upon the best and most approved principles. We remember well that when we first advocated the use of coal as fuel for locomotives on our railroads, there were plenty who defended the employment of wood, and it was a long time before our railroad companies could be driven from their old notions and practices. But now coal-burning locomotives are becoming the rule, and wood-burning engines the exception, especially in the eastern and middle States. On the Providence and Worcester Railroad coal alone is used on all the engines, and the cost for fuel is not quite one-half what it was five years ago.

BOILER EXPLOSION—ROTTEN IRON.

On the afternoon of Saturday, the 31st ult., a steam boiler on the sunken steamship *Granada*, which was used for working the draining pump, exploded with terrific force, and one man was killed by a fragment of the iron. The pump was used for pumping out the water in the vessel, and the explosion took place just after the furnace had been supplied with fresh fuel. The Coroner's jury, in the case of the person killed, rendered the following decision, on the 2d inst.:—

"That Luke Flannigan came to his death by the explosion of a boiler on board the steamer *Granada*, in the harbor of New York, on the 31st of December, 1859, and the jurors say that said boiler was defective and unfit for use previous to the explosion."

Here is a decision which criminates the owners of the boiler and steam pump, and the engineer in charge, yet what will be done to them? Nothing—nothing at all. Those who are placed in our courts to dispense justice, and are elected or appointed to execute our laws, are to blame for the great number of explosions which take place. If they did their duty, those who use steam boilers would not be so reckless in their management.

To Remove Clinkers in Stoves.—Persons troubled with "clinkers" adhering to the lining of their stoves or furnaces may be interested in knowing that by placing a few oyster shells into the grate, while the fire is ignited, the clinkers will become loosened so as to be readily removed without the danger of breaking the lining. We have tried this remedy; and while the chemical action is involved in mystery, it accomplished the result to our satisfaction. Who will explain the theory of the action of the gas emitted from the decomposition of the shells upon the clinkers?

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RESULTS OF PRACTICAL SCHOOLING.

Of all schools the most prolific has been the school of difficulty. Smiles, in his admirable work on "Self Help," says:—"Some of the best workmen have had the most indifferent tools to work with. But it is not tools that make the workmen, but the trained skill and perseverance of the man himself. Indeed it is proverbial that a bad workman never yet had a good tool. Some one asked Opie by what wonderful process he mixed his colors. 'I mix them with my brains, sir,' was his reply. It is the same with every workman who would excel. Ferguson made marvelous things—such as his wooden clock that accurately measured the hours—by means of a common penknife, a tool in everybody's hand; but then everybody is not a Ferguson. An eminent foreign *savant* once called upon Dr. Wollaston, and requested to be shown over his laboratories, in which science had been enriched by so many important discoveries, when the doctor took him into a little study, and pointing to an old tea-tray on the table, containing a few watch-glasses, test-papers, a small balance, and a blow-pipe, said, 'That is all the laboratory that I have!' Stothard learned the art of combining colors by closely studying butterflies' wings; he would often say that no one knew what he owed to these tiny insects. A burnt stick and a barn-door often served Wilkie in lieu of pencil and canvas. Bewick first practiced drawing on the cottage walls of his native village, which he covered with his sketches in chalk; and Benjamin West made his first brushes out of a cat's tail. Ferguson laid himself down in the field at night in a blanket, and made a map of the heavenly bodies by means of a thread with small beads on it stretched between his eye and the stars. Franklin first robbed the thunder-cloud of its lightning by means of a kite made with two cross sticks and a silk hankerchief. Watt made his first model of the condensing steam engine out of an old anatomist's syringe, used to inject the arteries previous to dissection. Gifford, when a cobbler's apprentice, worked his first problem in mathematics upon small scraps of leather, which he beat smooth for the purpose, whilst Rittenhouse, the astronomer, first calculated eclipses on his plow-handle. In like manner Professor Faraday (Sir Humphrey Davy's scientific successor) made his first experiments in electricity by means of an old bottle, while he was still a working bookbinder. And it is a curious fact that Faraday was first attracted to the study of chemistry by hearing one of Sir Humphrey Davy's lectures on that subject at the Royal Institution. A gentleman, who was a member, calling one day at the shop where Faraday was employed in binding books, found him poring over the article 'Electricity' in an encyclopædia placed in his hands to bind. The gentleman having made inquiries, found he was curious about such subjects, and gave him an order of admission to the Royal Institution, where he attended a course of four lectures delivered by Sir Humphrey. He took notes of the lectures, which he showed to the lecturer, who acknowledged their scientific accuracy, and was surprised when informed of the humble position of the reporter. Faraday then expressed his desire to devote himself to the prosecution of chemical studies, from which Sir Humphrey at first endeavored to dissuade him; but the young man persisting, he was at length taken into the Royal Institution as an assistant; and eventually the mantle of the brilliant apothecary's boy fell upon the worthy shoulders of the equally brilliant bookbinder's apprentice."

COPPER MINES AND MINING IN ARIZONA.

The St. Louis *Republican* says:—In conversation with a gentleman who has just arrived here by the overland mail from Arizona, we have learned some gratifying particulars in regard to the copper mines and copper mining in that interesting territory.

There are on the waters of the Rio Mimbres, one of the principal streams there, four mines, some of which are known and others are believed to be very productive. One of them, the Santa Rita, has been worked now a little over twelve months, and at this time yields two tuns of metal a day. The means of smelting are not very complete, but the ease with which the copper is extracted is remarkable. The metal is of an excellent quality, superior to the Lake Superior, and comparing well with the best Russian. The veins of ore are numerous, and yield about 25 per cent of copper. This mine is owned by some Mexican proprietors. The Hanover mine has been worked rather less than a year. It shows a vein which, at twelve feet from the surface, is fifteen feet thick. This ore is very rich, yielding over 30 per cent. The daily make is one tun and a half. This mine is owned by Messrs. Hinckle & Thibault. The two others mentioned are very recent discoveries, but promise very well. In fact there is no doubt among the best informed in Arizona that copper mines of great richness and fine quality abound there, and that Arizona is destined to be as noted for its products of copper as for those of silver.

There is a good growth of timber on the Rio Mimbres; and no deficiency in the mining localities mentioned of either wood or water.

All that has ever been claimed for Arizona as a depository of mineral wealth seems on the point of being confirmed in full. The silver mines are yielding well, and recently a tin mine has been discovered.

[If the above-mentioned tin mine is rich in the metal, we look upon its discovery as far more important than the mines of either silver or copper. At present we are entirely dependent upon imported tin, while we export copper, gold and silver.—EDS.

CAST-IRON WATER TOWER AT LYONS.—A new iron tower has been erected at Lyons, France, on the hill of La Croix-Rousse, and it is designed to raise the waters of the Rhone to a height of 490 feet, for subsequent distribution on the high grounds of Fourvieres, St. Just, St. Irenee, Oullins, and Ecully. The volume thus raised amounts to from 540,000 to 660,000 gallons every 24 hours. The total weight of the structure is about 110 tuns. The tower consists of a center column, 2 feet 3 inches diameter, of hollow cast iron, around which are arranged in the form of a hexagon six smaller columns of about 9 inches diameter, braced and tied together with wrought-iron connecting-rods. On the the top of these columns is fixed a tank of wrought-iron, 11 feet 6 inches wide by 10 feet deep, having ascending and descending pipes of cast iron, 12 inches diameter. Beneath this tank is an open gallery, to which access is gained by a cast-iron spiral staircase winding round the center shaft. The height to the gallery floor is 180 feet, and the total height to the top of the tank is 199 feet. We may observe, in addition, that this tower only forms a small detail of the great works of water supply lately executed. These consist of:—1. A filtering apparatus, capable of filtering 5,500,000 of gallons per twenty-hours. 2. Three Cornish pumping-engines, of 170 horses' power each. 3. 98,370 yards of pipes' ranging from 3 inches to 3 feet diameter. 4. 21,860 yards (lineal) of sewers. 5. A system of supply at high pressure to the third story, in two services—low service and high service. 6. Monumental fountains, hydrants, street cocks, &c. The whole of this vast system of distribution cost $18,000,000; and, excepting some details, such as the tower we have been describing, was completed in the short space of three years.

THE WORK OF THE SPINNING JENNY.—A century ago the value of all cotton goods manufactured in England was estimated at £200,000; and when the spinning jenny was invented in 1767, by Hargreaves a carpenter, the yearly exports of cotton fabrics did not exceed that sum. In 1858 the total value of the cotton manufactures exported, including twist and yarn, amounted to 43 millions of pounds sterling. A century back the total value of the textile fabrics exported from the United Kingdom did not amount to 5 millions; whilst the value of such fabrics exported in 1858 exceeded 69 millions. At the beginning of the present century the quantity of raw cotton imported into England was 50 millions pounds weight. The quantity imported had increased in 1850 to 663 millions, and in 1858 to a thousand millions of pounds weight, of which the value exceeded 30 millions of pounds sterling.

LOOK OUT FOR FIRE!—There are few more terrible deaths than fire, yet it is extraordinary how little care is taken to prevent accidents. Many lives and dwellings might be saved from destruction by properly guarding the grates. Indeed, with the present fashion of ladies' dresses, in apartments of moderate size, this care is really necessary; for we fear that it will be long before fire-proof fabrics are brought into general use. We have adopted in our dwelling a brass fire screen, made so as to fit around the grate and cover the whole fireplace; thus this fierce element is in a manner caged.

BLANCHING CELERY WITH SAWDUST.—Having had some trouble in the winter of 1857 in keeping late celery from rotting in a new kitchen garden, where the soil was very retentive and damp, and the plants earthed up in the usual manner, I have since used sawdust for the purpose, and find that it answers perfectly. Last winter all the late celery here was earthed up with sawdust, and it kept quite sound till April, and no slugs or insects attacked it underground; the heads being very solid, clear, and crisp, and well flavored. I had some doubts that the sawdust from resinous trees might give the celery a disagreable flavor, but on trial I found that not to be the case, and the sawdust is now taken indiscriminately from the sawpits, where different kinds of trees are sawn up. Before the late severe frost occurred in October, I had just finished the earthing-up of all the late celery with sawdust, and I find it now wonderfully fresh, the frost not having penetrated far through the surface of the hearts. The practice of using sawdust may be new to some, yet I often hear of the difficulty of keeping late celery from rotting in winter, and the more extended use of sawdust may be of advantage to other gardeners who, like myself, have stiff and damp soils to manage.—*Correspondent of the London Gardeners' Chronicle.*

PEACH TREES FOR FIREWOOD.—It seems a monstrous proposition to grow peach trees for firewood, yet the California *Farmer* maintains that it will "pay" to the grower; and, if so, that is enough. The above paper says:—

"Firewood is a heavy tax, and the value and price will increase for years unless we have railroads to the mountains and woodlands, that we may have access to them. We have several times reverted to the value of the peach tree as firewood, and we ask a serious attention to what will be found true, that there is no tree that can be planted so cheaply, or that will grow so quickly, as the peach, and while it is maturing for firewood, the fruit will pay for the labor three or four times. A thousand acres can be planted on some land of little value, say a sandy, gravelly highland. The peach-pits can be planted in furrows made with a plow in straight lines, sixteen feet apart, and covered with the plow again. The fruit that falls the swine can eat, and nothing is better for a swine-pasture than a large peach-orchard. The good fruit can be gathered, cut and dried, and shipped abroad with profit. In six or eight or ten years the trees will have reached a size fit for firewood, and there is no wood grown on the earth that is superior to it. Whoever wishes to make his 'pile,' can do so with a little expenditure, for this will be done by somebody."

MANAGING AND FEEDING WORKING OXEN.—Oxen working on a stone-drag, on the foot of a plow, on the sled tongue, cart spire, or twitching stones or timber, should carry their heads up, as this enables them to do this work mueh easier: those that work as leaders, forward of other oxen, should carry their heads low, and have the yoke the right length, let the bows suit the neck; the yoke and bows to the leaders should set a little snugger than the nib oxen. Never use the whip but from necessity. When about to strike the young steer or ox, ask yourself, "Will he know what I strike him for?" Let each ox have a name, and be sure he knows his name. Never speak a word to an ox without meaning; have a particular word to start your team by, that all may pull together. Never hurry your team while riding behind them, lest they learn to haul apart. Oxen should be shod with a broad shoe, to travel on hard roads; the shoe on the fore-foot should set back at the heel, nearly half an inch further than the hoof bears upon it. Oxen are frequently lamed by reason of short shoes. The best feed for oxen at hard work, is to give to each two quarts of meal, wet mixed with good chopped hay, three times a day, and as much hay as he will eat; this is the highest feed working oxen ought to have, and on this they will work every day.—*Yankee Farmer.*

LATENT LIGHT.—At the last meeting of the British Scientific Association, Sir D. Brewster exhibited a piece of chalcedony, within which a minute landscape could be seen. If kept in total darkness for four hours, this marvelous picture vanished, but re-appeared as vivid as ever on ten minutes exposure to the sunlight; proving that not only could a design be mysteriously insinuated into the interior of the mineral, but that light could be stored up therein and produced at will. It was surmised that this effect had been produced by the action of nitrate of silver.

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DISSOLVING INDIA-RUBBER.

MESSRS. EDITORS:—Having just received the last number of the first volume (new series) of the SCIENTIFIC AMERICAN, I cannot refrain from snatching time to express my deep gratification. It is now nearly nine years since I first subscribed to your paper; and I can say of it (what I can of none other of the number that I regularly take), that, in all those years I have seen only *one* article that has not been fair, honest and manly, disinterested and sound. This is strong praise; but I feel that it is deserved. Nor is this all. From circumstances of my life I am one who is compelled to look deeper than a mere scientific man would look at the drift of the various positions and assertions in their bearing upon revealed (scriptural) truth; and it is a sincere gratification to be able to say that in all scientific questions, in which far too many are found to set against each other revealed truth and discovered truth, *you*, Messrs. Editors, have invariably taken the sound conservative ground of assured harmony between the two; and hence I feel that the influence exerted by the SCIENTIFIC AMERICAN is not only for the enlarging of the bounds of knowledge, but for the establishing of the grounds of religion.

And now that I have expressed the gratification that I have felt in review of my past years of subscription, and of your constant progress in the value and excellence of your paper, let me add a few lines respecting a point mooted by two of your correspondents, in which they seem to contradict each other, and yet it appears that they are reconcileable. I mean, respecting dissolved india-rubber. One asserts that rubber dissolved in turpentine will not dry, and another maintains that it *will*. Allow me to suggest that both are right. Your last correspondent, who spoke of applying this varnish to boots, and of its drying there, has supposed absorption to be dessication. Thin varnish of india-rubber will dry when applied to any substance which will sufficiently absorb a portion of the adhesive matter; but as a mere varnish applied to any hard body or non-porous substance it will *not* dry. Rees, in his "Encyclopædia," speaks of this in reference to balloons; Mackenzie, in his "Compendium of Varnishes," said the same. In the one case absorption assists the process of dessication. Will not this reconcile the apparent discrepancy?

R. W.

New Berlin, N. Y., Jan. 4, 1860.

[Our valued correspondent informs us that the "one article" which he says did not wholly please him, was one respecting perpetual motion. The particular article, however, he does not name, but it is of no consequence. The praise he bestows upon the SCIENTIFIC AMERICAN is exceedingly gratifying.—EDS.

HISTORY OF IRON SHIPS.

MESSRS. EDITORS:—On page 406, Vol. I. (new series) SCIENTIFIC AMERICAN, in answer to a correspondent, it is stated you had been informed that a small iron steamer was launched in London in 1821. The first iron boat built, so far as I know, was a row-boat, in the year 1821, on the river Tyne, at Gateshead, England. The inventor was Samuel Thyne. Three brothers and two other persons joined him; when their employer, Sir Robert Shafto Hawks, found out what they were buying sheet iron for, he gave it to them, likewise a silk flag. A small iron anchor was gilded and fastened to the top of the flag-staff; cannon were fired, and quite a demonstration made when she was launched. She was very light, and one of the partners, who still had doubts of her floating, early on a summer's morn, when the painter was going to decorate her, carried her down to the water, and solved the problem. She successfully ran races against wooden boats of the same capacity. Some of the party or their acquaintances getting drowned at the "Barges" (an annual corporation festival held on Ascension Thursday on the river Tyne), caused them to lay her up, and she rusted away.

I have the anchor which was carried on the flag-staff of this boat; and I recollect reading an article, a few years ago, in *Chambers's Edinburgh Jouraal*, speaking of this boat on the Tyne as being the first ever built. Samuel Thyne, the inventor, is an old man in poverty, now living at South Shields, England. All his reward, hitherto, is the knowledge that thousands of his fellow-beings are getting a good living out of his invention.

Pittsburg, Pa., Jan. 4, 1860. W. T. G.

COATING ELECTROTYPE PLATES WITH IRON.

MESSRS. EDITORS:—The following process I have successfully employed in coating electrotype deposits with a coating of pure iron; thereby rendering them little inferior to steel plate engravings, as regards durability.

Dissolve 1 lb. of sal ammoniac in 1 gallon of rain water, then add 2 lbs. of neutral acetate of iron, boil the solution in an iron kettle for two hours, replacing the water lost by evaporation; when cold, filter the solution and keep it in close covered vafs (when not in use) to prevent oxydation.

The iron plate used in the decomposition cell must be of the same surface as the plate to be coated with iron; a Smee's battery of at least three cells, charged with 1 part sulphuric acid and 60 parts water, being used for the decomposition.

To ensure success the following rules must be observed:—1st, The plate must be thoroughly freed from any greasy matter by immersion in a solution of caustic soda, then rinsed in clean cold rain water, after which dip it in dilute acetic acid, and immediately transfer it to the solution of iron; this will ensure perfect adhesion between the metals. 2nd, The solution must be filtered previous to use, to remove the oxyd of iron formed by exposure to the atmosphere. After the plates have been coated with iron they must be well rinsed in clear warm rain water, then in a weak alkaline solution, well dried with a piece of clean soft cotton, and slightly oiled to prevent oxydation.

The coating of iron is very hard and brittle, resembling the white iron used by manufacturers of malleable iron. Should any of the surface be damaged, the whole coating of iron may be removed by immersion in dilute sulphuric acid, and re-coated again by the above process.

R. W.

Newark, N. J., Jan. 2, 1860.

CASHMERE GOATS.—The most beautiful shawls in the world are made from the long silky hair of the Cashmere goat, and it appears to us that this animal may be acclimated in many of the southern States. We are glad to learn that attempts are being made by enterprising planters in the South to acclimate it. We learn from the Savannah (Ga.) *Republican* that a small flock of the pure breed has recently been imported by the Hon. W. H. Stiles, of that State, and that, in all likelihood, they will be as much at home in Georgia as on the mountains of Asia. This is the second importation of such goats into Georgia, the first having been made several years ago, from which a number of flocks, especially half breeds, have been raised, all of which are prospering; and they promise, at some future day, to supply our markets with a manufacturing material which has made the name of Cashmere famous throughout the world.

CITRIC ACID IN ACUTE RHEUMATISM.—Dr. Hartung states that this substance acts more efficaciously than lemon juice in acute rheumatism. He forms a mixture with six drachms dissolved in five ounces of water, and sweetened with two ounces of sirup. This is to be taken in from 15 to 36 hours, the patient also drinking as much cold water as he pleases, and the parts being wrapped in wadding. Of 45 cases of acute rheumatism, some of them very bad ones, so treated, in two only was the result not satisfactory. Sometimes, even after 24 hours of treatment, there is a notable diminution in the pain and fever, although, in most cases, from two to three days are required to produce this amendment. The remedy does not induce diarrhea, and it favors transpiration.—*Druggist's Circular.*

STEAMBOAT DISASTERS ON WESTERN RIVERS.—The St. Louis (Mo.) *Democrat* gives the losses for 1859, as follows:—Steamboats sunk, some of which were subsequently raised, 62; steamboats burnt, 26; steamboats lost by explosions, 4; steamboats exploded steam-pipes, 2; lives lost by steamboat disasters, 396; estimated loss of property, $2,333,000. The sinking of the sixty-two steamers was the result of the following causes: Encountering snags, logs, sawyers and stumps, 25; ice, 3; foundered in storms, 3; collisions with hidden obstructions, 31. There were, in all, collisions of boat with boat, or with river banks, bridges and wharf boats, causing disaster or considerable damage, 28.

A COLUMN OF VARIETIES.

Lord Ross' great telescope is a reflecting telescope; the concave mirror or speculum is 6 feet in diameter, 5½ inches thick at the edges and 5 inches thick at the center, and weighs about 3 tuns. It is composed of copper and tin—126 parts of copper to 57½ of tin. Its focal distance is about 54 feet. It was ground with emery under water by the power of a small steam engine, and the process of grinding occupied 6 weeks. The whole telescope weighs 15 tuns.....The mode in which the celebrated philosopher, Du Buat, measured the velocity of water at the bottoms of rivers was by throwing in a gooseberry, as nearly as possible of the same specific gravity as the water. It was carried along the bottom almost without touching it.....The action of a mixture of sulphuric and nitric acid on cane sugar forms a glutinous soluble mass, which, when first washed with water and dried, and then highly heated, explodes without residue. It is known as explosive sugar.....Many rivers, by the deposit of solid matters held in suspension in their waters, are constantly raising their banks. The surfaces of many rivers in alluvial districts are considerably higher than the land at a few miles on either side of them.....The roof of Westminster Hall, London, constructed of sweet chestnut timber, is 460 years old.....Wooden sailing vessels have occasionally remained sound after 100 years' active service.....Iron and wooden ships are, other things being equal, insured at equal rates.....The term "Sicilian Vespers" is generally used in reference to a terrible massacre of the French rulers of Sicily which took place in an insurrection of the people in 1282.....At the time when the battle of New Orleans was fought, Jan. 8, 1815, a treaty of peace had been signed in Europe between Great Britain and the United States, but the news of it had not reached this country.....The very common notion that the breastworks at the battle of New Orleans were formed of cotton bales is a mistake; they consisted almost wholly of earth.....The remark, so generally attributed to General Taylor at the battle of Buena Vista, "A little more grape, Capt. Bragg," was not uttered at the time, as was publicly stated by Captain Bragg just after the election of Taylor to the Presidency.....The exclamation so often attributed to Wellington at Waterloo, "Oh! for night or Blucher," is stated, on good historical authority, never to have escaped the lips of the Iron Duke.....There is a form of charcoal known as mineral charcoal, which is found associated with coal. Fine specimens have been obtained near Glasgow from the neighborhood of trap-dykes and blind-coal.....In Tuscany and other parts of Italy and Sicily, volumes of steam, called fumaroles, issue in large quantities through openings in the earth.....Locomotive tires are gradually extended in circumference by the friction to which they are subjected. They often become so loose upon the wheels as to require to be taken off and set anew.....In testing the ashes from coke, burned in the copper fire-boxes of locomotives, a considerable quantity of copper has been found. No such deposit was detected when white ash coal was burned.....Dr. Joule found that the power derived from the combustion of one pound of coal in a furnace was equal to that obtained by the decomposition of 9 lbs. of zinc in a galvanic battery.....If a small quantity of a solution of starch be exposed for a short time to the light of the sun it will be converted into grape sugar.....The surface of a stream flowing with any considerable velocity is always higher in the middle than at the sides.....The *Industry*, a timber-built steam vessel, launched on the Clyde in 1814, is still in existence.....Water, in passing from the solid to the liquid state, converts 140 degrees of sensible into latent heat; in passing from the liquid to the aeriform condition it absorbs about 1,000° of heat, rendering it latent. Alcohol, in evaporating, absorbs 374° of heat; ether, 163°; and spirits of turpentine, 138°.....Ehrenberg, who is called the father of microscopy, differs from nearly all the microscopists of the world in regard to certain little organisms being animal or vegetable; they move along with a slow steady motion through the water, and Ehrenberg calls them animals, but it is generally regarded as settled that they are vegetable.....Many animals, some microscopic and some visible to the naked eye, are fastened permanently to the rock on which they grow, and so nearly resemble a plant that no casual observer would take them to be animals.....Some of the microscopic animals resemble very closely a string of square beads, a part of them joined merely at the corners.

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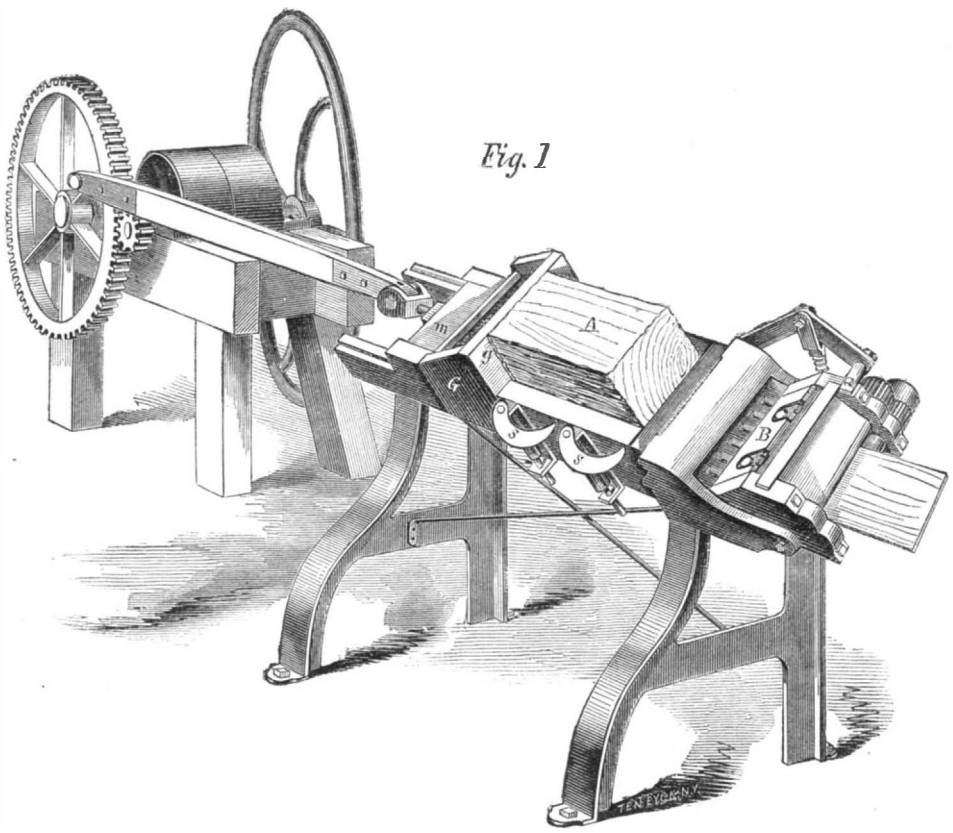
IMPROVED SHINGLE MACHINE.

The well-established superiority of rived and shaved shingles over those which are sawed, and the vast amount of manual labor which is annually expended in shaving shingles by hand, has called forth a great deal of inventive effort to devise some mode of accomplishing the same results by means of machinery. We have seen some large and expensive machines which made very handsome shaved shingles, but it is of course very desirable to supersede them by others smaller, cheaper and more simple. Such is the object of the invention which we here illustrate.



NEW PATENT SHINGLE MACHINE.

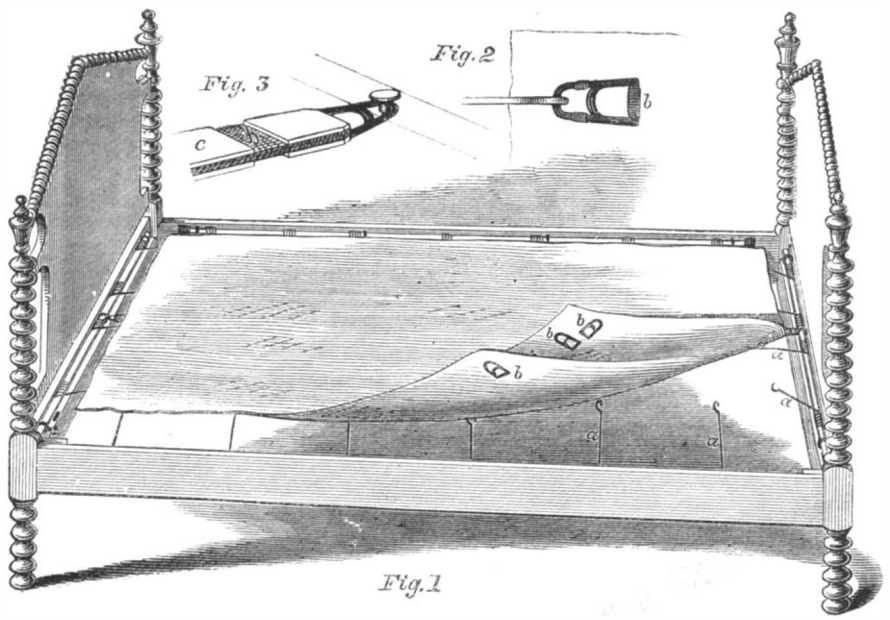
A is the bolt from which the shingles are to be rived, previously got out in proper size and form, now placed upon the inclined bed of the machine, as shown. The bolt remains stationary, merely dropping down as the shingles are rived from its lower side, while the knife, H, Fig. 2, is fastened to the right hand end of the bed, *m*, which receives a reciprocating motion from the crank, *r*, Fig. 2. The shingle is split off as the knife is being drawn back from the right to the left, dropping down upon the slats, *j*, ready to be pushed forward through the shaving knives on the return of the bed, *m*. The slats, *j*, are about an inch in width and an inch apart, and are stationary, while the reciprocating bed, *m*, is furnished with similar slats sliding freely between the slats, *j*. The square ends of the moving slats coming against the end of the rived shingle press it between the planing knives. As the bed, *m*, moves from the right to the left, the crescent-shaped plates, *s s*, turn in between the parting shingle and the remainder of the bolt, and support the bolt till the stroke is completed; when the bed, *m*, returns from the left to the right it presses the plates, *s s*, out from beneath the bolt, allowing it to fall down upon the bed, *m*, in front of the riving knife. In this motion of the bed from left to right, the shingle is planed in the proper wedge shape by being pushed between the knives, C C, which are gradually brought more nearly together during the passage of the shingle. This motion of the knives is effected by bolting them securely to the slides, B B, and imparting to these slides a short reciprocating motion by means of the cranks, D D. These cranks are secured to the axles, *d d*, which gear together, as shown at e, and receive a rocking motion from the lever, E, shown in dotted lines, which is attached to one of the axles, *d*. This lever has a forked elbow at its end which grasps the inclined ledge, *g*, which ledge is fastened upon the further side of the sliding bed, *m*, and as it moves along, raises and lowers the end of the lever, thus alternately drawing the knives, C C, apart and pressing them together with great force. By varying the inclination of the different portions of the ledge, *g*, the shape of the shingle may be regulated at pleasure. These combinations make a compact, simple machine which produces a very handsome shaved shingle. It is complete in itself, requiring no engineering skill to place it, and the several motions are effected by such arrangement as to make them very certain in their relations to each other.

The patent for this invention was issued through the Scientific American Patent Agency, Dec. 13, 1859. The inventor is E. R. Morrison, who assigned the invention to S. C. Hills, to whom the patent was granted and who may be addressed for further information in relation to the matter at No. 12 Platt-street, this city.

HATCH'S BED BOTTOM.

This is a bed bottom of sacking or canvas, attached to the bedstead by elastic spiral springs, and supported in the middle by an elastic bar, with an improved mode of attaching the sacking to the springs.

In the annexed cut, Fig. 1 represents an ordinary bedstead with strips of wood secured firmly to the insides of the side and end rails. To these strips small cylindrical rods are fastened by means of screws with solid ring heads, through which the rods pass. Wrapped around these rods are the spiral springs, *a a a a*, one end of which is pushed into the strip beneath to keep the rod from turning, and the other end projects upward and inward towards the middle of the bed, and is bent to form a hook. To these hooks the sacking is attached by means of the metallic loops, *b b b*, illustrated on a larger scale in Fig. 2. These loops may be made of malleable iron, and fastened to the lower side of the sacking with thread or twine. A hand hook is used to stretch the sacking in placing the loops upon the hooks of the spiral springs, and when the sacking becomes stretched by use, it may be tightened by catching the cross bars of the loops upon the hooks. Fig. 3 shows the end of the middle bar, C, which is stretched longitudinally below the sacking to prevent the sagging of the bed in the middle. This bar is divided near each end, and joined by the elastic webbing, *d*, which with its own elasticity, prevents it from being too rigid and thus incommoding the occupants of the bed.



HATCH'S IMPROVED BED BOTTOM.

Elastic canvas or sacking bed bottoms are particularly adapted to warm climates or hot seasons, especially for invalids who are confined for a long time to their beds. It will be seen that the mode of connection here described renders it very easy to attach this bottom to berths in ships and steamers, and to bedsteads of any width. We have seen a child's crib, constructed after Mr. Hatch's patent, and we consider is well adapted to such an application.

The patent for this invention was issued, through the Scientific American Patent Agency, to Royal Hatch, Aug. 30, 1859, and persons desiring further information will please address the manufacturers, Henry C. Hatch & Co., Strafford, Vt.

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Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY

At No. 37 Park-row (Park Building), New York.

O. D. MUNN, S. H. WALES, A. E. BEACH.

TERMS—Two Dollars per annum.—One Dollar in advance, and the remainder in six months.

Single copies of the paper are on sale at the office of publication, and at all the periodical stores in the United States and Canada.

Sampson Low, Son & Co., the American Booksellers, No. 47 Ludgate Hill, London, England, are the British Agents to receive subscriptions for the SCIENTIFIC AMERICAN.

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VOL. II., NO. 3.....[NEW SERIES.].....*Fifteenth Year.*

NEW YORK, SATURDAY, JANUARY 14, 1860.

RECOVERING LOST GOLD.

GOLD is among the heaviest of metals, and yet is of such a ductile character that it may be beat into leaves so thin as to be blown like the down of the thistle. It is found in almost every country, yet it is only under certain circumstances that it can be worked with profit. In California and Australia it has been found in nuggets and scales, and these have been so abundant as to yield large returns to the miners. It is also associated with quartz rock, as its matrix, in those countries, and in such quantities as to yield large returns for crushing the rock and securing the metal by amalgamation. Long before California came into our possession, and before its immense gold fields were discovered, we had gold mines in Virginia, North Carolina and Georgia, from which the precious metal was obtained from auriferous quartz. These mines are still worked, and by a scientific discovery, for which a patent was issued to Professor T. M, Fell and Mr. J. N. Wykoff, in the month of July last, they are destined to yield three times the amount of gold that was ever before secured by the old processes.

It is well known that some of the richest gold quartz does not present the appearance of gold. It is clear and white, and it is only by crushing, washing and amalgamating it with quicksilver, that the amount of gold contained in it can be known and obtained. This shows that the gold is disseminated through the rock in a very finely subdivided condition, and the question naturally arises, may not a great quantity of this metal be washed away in the water, owing to the particles being so fine as to float and remain suspended? To this we return an affirmative answer. By the invention alluded to, the *tailings*, and what has been called "the refuse of gold washings," have been operated upon, and more gold taken therefrom than by the first treatment when all the gold in the quartz was thought to be secured. By the new process the ground quartz is submitted to the action of heat, water and agitation in connection with mercury; and quartz, from which about from three to four dollars of gold per tun were taken out, has yielded an average of fifteen dollars. This process is now in operation at the Melville gold mines (about 20 miles from Fredericksburgh), in Spotsylvania county, Va., where it can be seen and examined. By it some ores of gold, which, by the old processes, had not yielded any precious metal, have been worked successfully. Thus from one pound of ferruginous sulphurets of gold as much as one grain of gold and half a grain of silver have been reclaimed. The leading idea of the invention is the bringing the mercury into such intimate connection with the fine gold by minute dissemination throughout the amalgamating vessels, as to touch all the particles, however fine, and combine with them. By such a method of treatment gold quartz, which has been held unprofitable to operate, may now be made to yield good returns; and the sands which abound in many parts of our country, where no gold was ever thought to exist, may yet be made to yield large profits for working.

Gold is found in small quantities in most countries; it is sometimes mixed with iron pyrites, copper pyrites and galena, but it is generally disseminated in veins through quartz rocks, and it is among these that it is principally sought. It is true that gold is obtained by washing the sands of rivers in Africa, Hungary, and some other countries, and no doubt the sands of many of our rivers, especially the mixed black ferruginous and quartz kinds, contain it in considerable quantities; but by the old methods of washing and amalgamating it would not pay to operate them. By the new method, however, these sands may be ground and operated with success for their gold, and we have seen some samples of such, from which, we were assured, more than fifteen dollars per tun had been reclaimed. Here is another spacious field for operation during the year 1860, to increase the yield of our precious metals.

QUICKSILVER OR MERCURY

The value of this metal is not generally appreciated. Without it no gold could be obtained from the quartz rocks that now yield it in large quantities. It is a very peculiar metal; at ordinary temperatures it is a fluid, but such is its affinity for gold that when brought in contact with it, a mechanical union is formed, and a different compound produced. The mercury seems to enter into the pores of the gold, as water passes up through a fibrous substance by capillary attraction. It forms an amalgam and separates the gold from the quartz and impurities, and in this manner the precious metal is obtained. But as the mercury and gold form an amalgam, the precious metal must be separated afterwards, or it can be of no use. In this emergency the nature of the quicksilver affords an easy solution to the problem. By placing the amalgam of gold and mercury in a bag of chamois leather, the mercury can be squeezed through the pores of the bag, while the precious metal is left behind. A perfect separation of the two metals, however, cannot be accomplished in this manner; some gold still remains combined with the mercury; but another and certain method of separation is at hand. By placing the amalgam in an iron retort and submitting it to heat, the mercury, being volatile, passes off in vapor, leaving the gold behind in a pure condition. The quicksilver is condensed after passing from the still, and is made to do duty a thousand times—over and over again—in reclaiming gold. It requires about two pounds of mercury for amalgamation to reclaim one pound of gold. Its avidity for gold is wonderful; the quality which it possesses of seizing upon the auriferous particles floating among the dirt and other products of the rocks, in water, is surprisingly strange.

Mercury has been known from the remotest ages; it is chiefly found in a state of nature combined with sulphur, and as a sulphide it is called cinnabar. There are extensive tracts of mercury ore in California, where it is smelted and distilled, and the fluid metal secured for the gold miners. It is placed in iron flasks for use, and it is a singular fact that while it has such an affinity to unite with gold, it has none for iron. Great quantities of it pass off in the amalgamating process, about five per cent being generally lost at each operation; hence fresh supplies are continually required to restore the waste. The quicksilver mines of California are very valuable, and severe contests at law have arisen in regard to the titles by which the cinnabar lands are held. Although mercury is a fluid and beaten gold very ductile, yet no sooner do these two metals combine than the gold becomes extremely brittle, or rather the amalgam formed with gold and mercury is very brittle. A gold ring rubbed with quicksilver becomes perfectly *rotten*—so brittle as to break very easily.

EFFECT OF ARTIFICIAL LIGHT ON VEGETATION.—In answer to an inquiry on this subject, a correspondent of the London *Builder* states:—"I planted vegetables in a place where daylight could not penetrate, over which I suspended a paraffine oil lamp, with a reflector to throw the light upon the plants. They have grown up a beautiful dark green. I have also lighted a greenhouse with lamps every night, and find it not only increases vegetation, but gives a beautiful deep tinge to the plants."

POWER LOOM EXTENSION.—Warren Dutcher, of Milford, Mass., obtained a patent June 27, 1846, for an improvement in power looms. He has now made an application to the Patent Office for its extension for seven years beyond its original date. The testimony in this case closes on the 28th of May, and the petition is to be heard on the 11th of June, at 12 o'clock, at the Patent Office.

SCIENCE IN FAMILIAR THINGS—SALTING THE STREETS TO REMOVE SNOW—ITS EFFECT UPON HORSES' HOOFS.

Coming to our office the other morning, we saw a man strewing salt along the railroad track for the purpose of melting the snow. This is the common practice on our city railroads, but objections have been made to it on account of its injurious effects on the horses' feet. Both of these facts—the melting of the snow by the salt and the injury to the horses' feet by the liquid—are instances of the application of the most beautiful and subtle principles of science to the common affairs of life. There are several substances besides snow and salt which are solid when separate, but which, on being placed in contact, become liquid; why they do so is wholly unknown. It is just as completely a mystery to Professor Faraday or Professor Doremus as it is to the most ignorant laborer that strews the snow with salt. But the cold that results from this change of the two substances from the solid to the liquid form is one of the exhibitions of latent heat—a matter which has been the subject of profound and laborious investigations, and which is found to play a part in the operations of steam and air engines, in the artificial making of ice, and, indeed, in almost all the mechanic arts. The subject, when properly stated, is perfectly simple.

If a piece of very cold ice, of a temperature far below the freezing point, is brought into a warm room, the ice will become warm gradually till it reaches the temperature of 32°, at which point it will remain till the ice is all melted, when the increase of temperature will be resumed, and will go on till the water becomes as warm as the air in the room. If the relative temperature of the room and ice is such that the cold ice is warmed one degree a minute, it is found that the temperature rises at this rate till it reaches 32°, at which point it stops and remains for 140 minutes, during which the ice is all melted, after which the rise in the temperature again goes on at the rate of one degree a minute. The heat, which enters the ice while it is melting, does not affect the thermometer and is not perceptible to the senses; it is hidden, and therefore called latent heat. The sensible heat, which becomes latent in the change of bodies from the solid to the liquid condition, varies with different substances—in water, as we have seen, it is 140°; in sulphur it is 144°; in lead, 370°; and in zinc, 493°.

Now, it is found that when two solid substances are changed to the liquid condition by simply being brought in contact, this change is accompanied by the conversion of sensible into latent heat; a large amount of heat is rendered latent, and this is absorbed from surrounding substances. This is the philosophy of freezing mixtures. If one pound of salt is mixed with two pounds of snow and a thermometer placed in contact with the mixture, as the mass melts it will absorb so much heat from the mercury as to carry it down to 5° below zero. If a horse's foot is in the mixture a portion of this heat must come from the foot, and it is not strange that it should frequently leave the part so intensely cold as to prove injurious.

NEW PHOTOGRAPHIC PROCESS.

[Translated for the SCIENTIFIC AMERICAN.]

The discovery, by Mr. Schweitzer, that the cuprate of ammonia ($Cu_2 O + H^4 N O$) dissolves easily the fibers of cotton, has brought me to think whether this fact could not be applied with advantage to the photographic process. After a great many experiments I have succeeded in finding out an easy and not very expensive method.

The simplest and readiest way seemed to be, to dissolve in a solution of cotton, in the above-named copper salt, newly precipitated oxyd of silver, to spread the solution on a glass plate, to dry the stratum on the same, and to pass it through diluted hydro-iodic or hydro-bromic acid. Thereby certainly a white stratum of iodide or bromide of silver is obtained, but I never succeeded in producing a clear and transparent picture. Below the stratum of cotton forms always a continuous layer of reduced silver, and the picture on the surface is lost. In vain I applied simple bromide of cuprate of ammonia ($Cu^2 O + H^4 N O + Br$) or simple iodide of cuprate of ammonia ($Cu^2 O + H^4 N O + I$); in every case a brown stratum of metallic silver formed below the picture. I communicate this fact to save others from making useless experiments.

By using the following means I succeeded to perfection:

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To prepare the solution of cuprate of ammonia, a concentrated solution of sal ammoniac is saturated with newly precipitated oxyd of copper; or the method of Peligot may be used, which I recommend to the photographers as very easy to execute. After the solid impurities have completely settled in this solution, perfectly white cotton is dissolved in the same in the proportion of 10 grammes to the litre. A thick liquid is thus obtained which is diluted with some water, so that the cotton is entirely dissolved. This liquid is mixed with a concentrated solution of iodide of potash, so that one litre of the solution contains from 5 to 10 grammes of iodide of potash. The liquid thus obtained (which may be preserved for any length of time) is spread on the glass plates. Upon the correct preparation of the solution of cotton in the cuprate of ammonia the beauty of the picture entirely depends. This solution should be thick, so as to spread slowly on the plate, and when dry the stratum should be perfectly transparent, without a dull appearance. Should the solution be too thin the picture is only superficial, and a stream of water is sufficient to obliterate it.

When the solution of cotton has thus been poured upon the glass plate, it spreads over it quite easily and, as it evaporates slowly, the liquid (by means of the end of a glass tube) can be brought to flow to those spots which, from the beginning, may have remained uncovered. The surplus liquid is made to drop off, and the plate is placed upright against the wall.

There are two different ways to proceed further:—

1 The plate is left to evaporate only for a few minutes; the surplus liquid collects at its lower edge and is removed by means of a piece of tissue (silk) paper, and the plate is now immersed in a newly-prepared bath of nitrate of silver which is diluted with acetic acid and with acetate of silver. The stratum becomes white, the same as with the usual mode of proceeding, by means of the iodide of silver formed in the same, and the plate is now exposed in the camera, and the picture fixed in the usual manner.

2 If the glass be left to dry entirely, the ammonia is expelled by evaporation, and the usual reaction of the iodide of potash on the copper salts takes place, and half-iodide of copper (Cu^2 I) is formed in the interior of the stratum of cotton, and iodine itself on its surface. Such a covering of the glass has a red appearance when dry, and if immersed in the nitrate of silver, a superficial picture is formed which is removed by the slightest washing, and besides, on account of the half-iodide of copper, metallic silver is formed below the picture. These difficulties I have removed by immersing the glass plate in pure alcohol, free of water, and saturated with a stream of dry gas of ammonia. The free iodine is transformed into iodide of ammonia and aldehyd is formed. An immersion of a few seconds is sufficient to render the glass white. After taking the glass from this bath, it is moved in the air, in order to remove the surplus ammonia by evaporation, and it is now, while still quite wet, immersed into the nitrate of silver, and the further operation is as usual. By this process very fine and extremely transparent pictures are obtained, and for this reason this process is peculiarly adapted for taking landscapes and buildings.

It is obvious that simple cotton will supersede, in future, the gun cotton or collodion in photographs; the preparation of the latter for this purpose being always attended with some difficulties. The process proposed by me is extremely simple, very economical, and it gives the finest pictures in a very short time, particularly by using the first method.

[The above-described process is the invention of D. Van Monkhaven, and we have translated the description from *Dingler's Polytechnic Journal*. The method of Peligot, mentioned in this article, for preparing the cuprate of ammonia, was published in the *Comptes Rendus*, in December, 1858, and it consists in running liquid ammonia several times through copper turnings inclosed in a vertical vessel. By applying heat the formation of the cuprate of ammonia is considerably facilitated. By adding to the liquid ammonia a few drops of dissolved sal ammoniac, and if. instead of using copper turnings, cement copper is used, the process is still further facilitated, and a solution of cuprate of ammonia is obtained which dissolves the fibers of cotton with great facility. If the solution should not be perfectly clear, it may be filtered over amianthus, as it would perforate paper in a few moments. According to Peligot, the liquid cuprate of ammonia dissolves an equal weight of cotton.—EDS.

FOREIGN NEWS AND MARKETS.

A little iron steamer of only 20 tuns burden, named the *Helen Coran*, built on the Clyde for a railway company in Bahia, South America, has made the passage across the Atlantic, but not without fearful risk. The captain and crew numbered only five individuals. The little craft was frequently almost buried under the waves, as it encountered several severe storms.

The London *Engineer* says:—"Trade is, on the whole, favorably spoken of at Sheffield. The American orders for steel of late, have been, on the whole, more regular and satisfactory than they were; and it may be safely said that, in all the heavy branches, there is a healthy, steady trade being done by the firms of established name and reputation. From some cause or other, however, difficult to explain, the orders for sheets have rather fallen off, more particularly for pen steel. The arrival of the winter season has at last had a chilling effect on the demand for crinoline steel, so that, for a month or two, the manufacturers will have a little rest until the orders for the coming season arrive; these, the manufacturers predict, will be larger than ever—the Empress Eugenie and the press notwithstanding."

An artesian well of 26 inches bore—the largest in the world—has been completed at Birmingham for the supply of a large bath house. The machinery employed to bore this well is similar to that used by the Chinese, and was found very efficient. It consisted of a heavy bar of cast iron, armed at its lower end with a number of cutting chisels, and was suspended by a rope, which received an up-and-down motion from a small steam engine at the top. The torsion of the rope was sufficient to vary the position of the chisels at each stroke. The apparatus of most well-borers consists of a cylindrical chamber secured around the cutting chisels, which, by means of valves, receives and retains the abraded portions of the rock as cut. The new apparatus invented by Mr. Greenly, the engineer of this well, consisted of a long cylinder, nine inches in diameter, with a valve and piston fitted in it like a pump. The cylinder was lowered down whenever the boring was to be cleared, and it was filled full of the *debris* by the sucker or piston being raised, when the whole was then drawn up.

The directors of the *Great Eastern* have borrowed £40,000, on the security of the vessel, to complete the whole work. It is stated that the company have claims against J. Scott Russell of £60,000 for the work not being done in a proper manner and in the exact time to go to America, according to contract. As a whole, this steamer appears to be a failure in a commercial and engineering sense, if the directors are to be credited.

A new method of inhaling chloroform has been introduced into the hospitals in Paris. It consists in inhaling the chloroform by one nostril only, the other being left to draw in air, so that a mixture of air and chloroform is thus taken into the lungs together. The chloroform is placed in a bottle with a narrow neck, the upper end of which is inserted in the nostril; the mouth must not be opened during the operation. By this process the patient feels no sensation of suffocation, nor is their any congestion of the brain. It is stated to be a safe and very simple plan in comparison with the common mode of chloroform inhalation.

A blacksmith, named James Sharples, of Blackburn, England, has just produced an elaborate steel engraving from an equally elaborate painting by himself. The artist is self-taught, both as a painter and engraver. The subject of the painting is a sturdy smith at the forge, swinging his hammer and making the sparks fly. The production is stated, by distinguished critics, to be a wonderful effort of genius, skill and perseverance. The painting is his own conception, and he labored at it for three years during his spare evening hours; and he then spent five years more during such hours in executing the engraving. Such perseverance deserves the highest praise.

At a late meeting of the Manchester Philosophical Society, Dr. Joule stated that the common method of testing the strength of steam boilers by hydraulic pressure, and by admitting steam into them, was not fair, because such conditions were not similar to those under which a boiler was commonly used. He had adopted a plan and had employed it for two years, which was free from all objections. It consisted in filling the boiler entirely with water, heating it to 90° Fah., then loading the safety valve up to the point it was to be tested. The gage is constantly observed, and if the pressure occasioned by the expansion of the water increases continuously up to the testing point, it may be safely inferred that the boiler has stood it without strain or rupture. This method of testing the strength of a boiler by the simple expansion of the water, occasioned by heat, is very simple, and can be executed by any person who has a boiler.

The prices of the English metals have somewhat changed since our last issue. Rails continue steady, with some more orders in the market. They are quoted at £5 12s. 6d. at the Welsh ports; wrought iron fishing rail chairs at £7 per tun; cast iron chairs at £4. A large business has lately been done in Glasgow with Scotch pig iron, and an advance of 2s. 6d. per tun has been made, the price being £2 17s. 6d. Spelter, £21 10s. Banca tin, £141 per tun. Straits, £138—a rise of about £3. Tin plates have also risen. On the whole, the British metal market has greatly advanced.

NEW YORK MARKETS.

CANDLES.—Sperm, city, 38c. a 40c. per lb.; sperm, patent, 50c.; wax, paraffine, 50c.; adamantine, city, 18c. a 21c.; stearic, 27 a 28c.

COAL.—Anthracite, $4.50 a $5; Liverpool orrel, per chaldron, $11; cannel, $12.

COPPER.—Refined ingots, 28½c. per lb.; sheathing, 26c.; yellow metal, 20c.

CORDAGE.—Manilla, American made, 8½c. per lb.; Rope, Russia hemp, 12c.

COTTON.—Ordinary, 8½c. a 8¾c.; good ordinary, 9½c. a 10c.; middling, 11½c. a 11¾c.; good middling, 11¾c. a 12¼c.; middling fair, 11¾c. a 12⅜c.

DOMESTIC GOODS.—Shirtings, brown, 30-inch, per yard, 6c. a 7¼c.; shirtings, bleached, 26 a 32-inch, per yard, 6c. a 8c.; shirtings, bleached, 30 a 34-inch, per yard, 7c. a 8½c.; sheetings, brown, 36 a 37-inch, per yard, 5½c. a 8¾c.; sheetings, bleached, 56-inch, per yard, 7½c. a 15c.; calicoes, 6c. a 11c.; drillings, bleached, 30-inch, per yard, 8¾c. a 10c.; cloths, all wool, $1.50 a $2.50; cloths, cotton warp, 85c. a $1.37; cassimeres, 85c. a $1.37½; satinets, 30c. a 65c.; flannels, 15c. a 30c.; Canton flannels, brown, 8½c. a 13c.

DYEWOODS.—Barwood, per tun, $18 a $20; Camwood, $130; Fustic, Cuba, $35 a $36; Fustic, Tampico, $22; Fustic, Savanilla, $19 a $20; Fustic, Maracaibo, $18.50 a $19; Logwood, Laguana, $22 a 23; Logwood, Tabasco, $21; Logwood, St. Domingo, $13 a $13.50; Logwood, Honduras, $16 a $17; Logwood, Jamaica, $12.50 a $13; Lima wood, $65 a $75; Sapan wood, $45.

FLOUR.—State, superfine brands, $5.25 a $5.30; Ohio, common brands, $5.35 a $5.40; Ohio, good and choice extra brands, $5.90 a $6.75; Michigan, Indiana, Wisconsin, &c., $5.40 a $5.55; Genesee, extra brands, $5.55 a $7.50; Missouri, $5.40 a $7.50; Canada, $5.50 a $6.75; Virginia, $6.25 a $7.25; Rye flour, fine, $3.75 a $3.90; corn meal, $3.75 a $3.80.

HEMP.—American undressed, $120 a $150; dressed, from $160 a $300. Jute, $87 a $90. Italian, $275. Russian clean, $190 a $200 per tun. Manilla, 6½c. per lb. Sisal, 5⅝c.

INDIA-RUBBER.—Para, fine, 55c. per lb.; East India, 50c.

INDIGO.—Bengal, $1 a $1.55 per lb.; Madras, 70c. a 95c.; Manilla 60c. a $1.15; Guatemala, $1 a $1.25.

IRON.—Pig, Scotch, per tun, $24 a $25; Bar, Swedes, ordinary sizes, $85 $86; Bar, English, common, $42.50 a $43; Refined, $52 a $54; Sheet, Russia, 1st quality, per lb., 11¼c. a 11½c.; Sheet, English, single, double and treble, 3⅛c. a 3⅞c.; Anthracite pig, $24 per tun.

IVORY—Per lb., $1.25 a $1.80.

LATHS.—Eastern, per M., $2.12½.

LEAD.—Galena, $5.80 per 100 lbs.; German and English refined, $5.65 a $5.70; bar, sheet and pipe, 5¾c. a 6c. per lb.

LEATHER.—Oak slaughter, light, 29c. a 31c. per lb.; Oak, medium, 30c. a 32c.; Oak, heavy, 28c. a 31c.; Oak, Ohio 29c. a 30c.; Hemlock, heavy, California, 19c. a 20c.; Hemlock, buff, 15c. a 18c.; Cordovan, 50c. a 60c.; Morocco, per dozen, $18 to $20.; Patent enameled, 16c. a 17c. per foot, light Sheep, morocco finish, $7.50 a $8.50 per dozen.; Calf-skins, oak, 57c. a 60c.; Hemlock, 56c. a 60c.; Belting, oak, 32c. a 34c.; Hemlock, 28c. a 31c

LIME.—Rockland, 80c. per bbl.

LUMBER.—Timber, white pine, per M. feet, $17.75; yellow pine, $35 a $36; oak, $18 a $28; eastern pine and spruce, $14 a $15; White Pine, clear, $35 a $40; White Pine, select, $25 a $30; White Pine, box, $14 a $18; White Pine, flooring, 1¼ inch dressed, tongued and grooved, $24.50 a $25; Yellow Pine, flooring, 1¼ inch, dressed, tongued and grooved, $29 a $32; White Pine, Albany boards, dressed, tongued and grooved, $20 a $21; Black Walnut, good, $45; Black Walnut, 2d quality, $30; Cherry, good, $45; White Wood, chair plank, $42; White Wood, 1 inch, $23 a $25; Spruce Flooring, 1¼ inch, dressed, tongued and grooved, each, 22c. a 24c.; Spruce Boards, 15c. a 17c.; Hemlock Boards, 12½c. a 14c.; Hemlock wall strips, 10c. a 11c.; Shingles, cedar, per M. $28 a $35; Shingles, cypress, $12 a $25; Staves, W. O. pipe, light, $55 a $5; Staves, white oak, pipe, heavy, $75 a $80; Staves, white oak, pipe, culls, $30 a $35; Staves, do. hhd., heavy, $70; Staves, do. bbl. light, $30 a $35; Staves, do. bbl. culls, $20; Mahogany—St. Domingo, fine crotches, per foot, 35c. a 45c.; St. Domingo, ordinary do., 20c. a 25c.; Honduras, fine, 12½c. a 15c.; Mexican, 13c. a 15c.

NAILS.—Cut, 3¼c. a 3¾c. per lb.; American clinch, 5c. a 5½c.; American horse-shoe, 14½c

OILS.—Olive, Marseilles, baskets and boxes, $3.40 a $3.50; Olive, in casks, per gallon, $1.13 a $1.25; Palm, per pound, 9c. a 9½c.; Linseed, city made, 57c. a 58c. per gallon; linseed, English, 57c. a 58c.; whale, fair to prime, 49c. a 52c.; whale, bleached 59c. a 60c.; sperm, crude, $1.37 a $1.41; sperm, unbleached winter, $1.45; lard oil, No. 1, winter, 87½c. a 92½c.; red oil, city distilled, 55c.; Wadsworth's

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refined rosin, 39c. a 40c.; Wadsworth's boiled oil for painting, 35c a 40c.; Wadsworth's tanner's improved and extra, 30c. a 40c.; Wadsworth's machinery, 50c. a $1 ; camphene, 45c. a 47c. ; fluid, 50c. a 55c.

PAINTS.—Litharge, American, 7c. per lb.; lead, red, American, 7c.; lead, white, American. pure, in oil, 8c.; lead, white, American, pure, dry, 7¼c.; zinc, white, American, dry, No. 1, 5c.; zinc, white, French, dry, 7¼c.; zinc, white, French, in oil, 9½c.; ochre, ground in oil, 4c a 6c.; Spanish brown, ground in oil, 4c.; Paris white, American, 75c. a 90c. per 100 lbs.; vermillion, Chinese, $1.12½ a $1.23; Venetian red, N. C., $1.75 a $2.25 per cwt.; chalk, $4 per tun.

PLASTER-OF-PARIS.—Blue Nova Scotia, $2.75 per tun; white, $3.50; calcined, $1.20 per bbl.

RESIN.—Common, $1.60; per 310 lbs.; strained, No. 2, &c., $1.60 a $1.75; No. 1, per 280 lbs. $1.87 a $2.25; white, $2.50 a $3; pale, $3 a $3.50.

SOAP.—Brown, per pound, 5c. a 8c.; Castile, 8¾c. a 9c.; Chemical olive, 7c. a 7¾c.

SPELTER plates, 5¼c. a 5¾c. per lb

STEEL.—English cast, 14c. a 16c. per lb.; German, 7c. a 10c.; American spring, 5c. a 5½c.; American blister, 4½c. a 5¾c.

SUMAC.—Sicily, $30 a $39 per tun.

TALLOW.—American prime, 10¾c. per lb.

TIN.—Banca, 32c.; Straits, 30c.; plates, $6.25 a $9.30, per box.

WOOL.—American, Saxony fleece, per lb., 55c. a 60c.; American full blood merino, 48c. a 52c.; extra, pulled, 45c. a 50c.; superfine, pulled, 39c. a 43c.; California, fine, unwashed, 24c. a 32c.; California, common, unwashed, 10c. a 18c.; Mexican, unwashed, 11c. a 14c.

ZINC.—Sheets, 7c. a 7¾c. per lb.

The foregoing rates indicate the state of the New York markets up to January 5th.

There has been a rise in the price of flour, but all the other markets, with the exception of oils, do not vary but a trifle from last week.

Foreign coals are scarce and in good demand; domestic are in good request and the arrivals tight.

Cotton has been dull, the sales being very limited. Political agitations seem to affect the manufacturing interests somewhat.

The jewelry business has been very dull for the past six weeks, and political agitations are blamed for this. In Newark the jewelry factories are doing almost nothing.

There is a large supply of hides on hand for the tanneries, viz., 215,000, against only 50,000 at this time last year. The sales are very small. Leather is firm in price, though the sales are very limited.

WEEKLY SUMMARY OF INVENTIONS.

The following inventions are among the most useful improvements patented this week. For the claims to these inventions the reader is referred to the official list on another page:—

GROOVED MACHINE PULLEYS.

In sewing machines and other machines in which a small grooved pulley is driven by a band from a larger pulley, there is, when ordinarily constructed pulleys are employed, a great tendency of the band to slip on the smaller pulley, more especially when the band becomes slack. The object of this invention is to prevent the slipping of the band, and to this end it consists in the construction of the grooves with radial teeth and nochtes, the edges of the teeth on either sides of the groove being arranged opposite or nearly so, to the center of the spaces between the edges of the teeth of the opposite one, and so causing the band to assume a more or less serpentine form, according as it is more or less slack, in passing through the groove. It further consists in so dividing the so-constructed pulley in a plane perpendicular to its axis and so applying screws to secure the two parts together, that the toothed sides or faces of the groove may be set nearer together or farther apart to make the band assume a more or less serpertine form in passing through the groove as may be desired. The credit of this contrivance is due to Louis Planer, of this city.

HOSE COUPLING.

This invention is an improvement in hose coupling for fire-engines and other purposes, the object of which is to enable the connection and disconnection to be made with a strong head of water flowing through the hose, thus enabling the fireman to make a connection without stopping the engine which, with the present style of hose coupling, must be done. In conjunction with the facility of coupling and uncoupling, a perfect joint is formed and securely locked, so that there will be no liability of the coupling becoming accidentally detached by handling. The screw is dispensed with, and the couplings can be made cheaper than the present screw couplings, while they are very compact and light. They are not so liable to derangement, and will not be materially affected by snow, ice or sand, which are sometimes very serious evils to the screw coupling. The invention consists in forming a connection and locking the male and female portions of the coupling together by means of peculiarly-applied eccentric levers. The patentee of this invention is Joseph Singer, of Cleveland, Ohio.

DOVETAILING MACHINE.

The object of this invention is to obtain a machine for cutting dovetails, such as extend entirely through the work, and are used for securing together the sides of boxes, and similar purposes. The invention consists in the employment of rotary cutters arranged on movable beds on which the work is placed, whereby the dovetails may be rapidly and perfectly formed and applied to cheap work, such as common boxes, which could not be done heretofore on account of the expense of forming the dovetails. Thomas H. Burley, of this city, is the inventor.

PHYSICIAN'S CANE.

This invention consists in having the cane hollow or formed of a tube closed at its bottom and having a semi-tube attached to the knob or handle, said semi-tube fitting within the cane and allowed to move freely in and out of it, and forming a receptacle for vials containing medicine. The invention is chiefly designed for country physicians who are compelled to carry medicines with them, and is intended to supersede the use of the cumbersome saddle bags, chests, &c., which are now carried by them. This device has been patented to S. T. Trowbridge, of Decatur, Ill.

CANT HOOK.

This invention consists in attaching the hook to the handle in such a manner that the hook and handle may be used when required in the ordinary way, and when the hook is not designed for use, the latter being capable of being so adjusted as to be out of the way, and the handle used as an ordinary lever. The invention is designed principally for the use of lumbermen and others who require both a cant hook and lever in performing their work, and to them, therefore, the invention will prove a great acquisition, saving time and the expense of one implement, as by this invention the two tools above-named are advantageously combined. This improvement was designed by Peter Hinds, of Cedar Run, Pa.

COAL EXCAVATOR.

The principal feature of this invention is that the rotary cutter head, which serves to act on the coal or other substance to be excavated, receives a four-fold motion; first around its own axis; second in a direction towards the spot to be acted on; third in a direction at right angles to the former direction; and fourth in an arc described around the driving axle of the machine, so that a long deep trench can be made before it becomes necessary to move the machine. The point of the cutters are forced up by springs so that they cut the trench wide enough to admit the head and the rods which support the same. This excavator is the invention of H. Wilverth, of Caseyville, Ky.

EVAPORATING APPARATUS.

This invention consists in so applying a steam coil or other heater, in combination with an evaporating pan or vessel, that it shall be capable of floating upon or in and at or as near as may be desired to the surface of the liquid, and of causing the evaporation to take place constantly at the surface, or at the same distance therefrom, whatever nay be the depth or quantity of the liquid in the vessel, by which means some important advantages are obtained over the usual mode of applying steam coils or heaters for evaporating purposes. The invention further consists in the employment, in combination with a steam coil or other heater that is capable of floating upon or in the liquid in an evaporating vessel, of means of elevating the same above the surface of the contents of the vessel, or of raising it entirely out of the vessel, or of sustaining the same at various distances below the surface of the contents of the vessel, to permit such manipulations or produce such effects as may be desirable The patentee of this invention is John Sutton, of this city.

RAILROAD SWITCHES.

A. W. Elliott and George S. Conkling, of Goshen, N. Y., have invented an improvement in switches, which consists in operating the switch rails so as to shift them to the right or left, and bring them in a line with the main track by peculiar-shaped and arranged levers which are situated under the cow-catcher of the engine, which levers extend back and are operated by the engine, so that, through the medium of pivoted levers of a suitable length, the ends of the switch rails will be gradually but surely elevated out of recesses in the sleeper for the ends of the rails to rest on, and shifted to the opposite track, in a line with the rails, and placed in recesses opposite the rail ends where the switch rails are secured against any lateral thrust occasioned by the passing train. The levers are elevated, and, at the same time, thrown to the right or left, as occasion may demand; and when brought directly in a line with the rails over which the train is to pass, they are permitted to fall in place by their own gravity.

PILOT WHEEL.

This invention (by James S. Colvin, of Pittsburgh, Pa.) consists in enlarging the shaft or axle in such a manner that when the rudder is parallel with the sides of the vessel, the tiller rope will be wound upon the largest diameter of the axle; and, when the rudder is placed oblique with the sides of the vessel—or, in other words, brought "hard round," where the greatest power is required to keep it in a steady position—the rope will be wound upon the smallest diameter of the axle. The rope thus acting upon circles of different diameter, the movement of the rudder gradually increases as it arrives at a straight line or parallel with the sides of the vessel, where it has the least resistance from the water; and its movement gradually decreases as the rudder is changed out of its straight course, thus taking mechanical advantage of the varying pressure of the water, and enabling the pilot to operate the rudder with greater ease and speed, as it arrives nearer a straight line. It also consists, in combination with this peculiar-shaped axle, in forming deep grooves in its surface, which run spirally from end to end of the enlargement, and keep the rope in place and prevent it from riding.

FOWL GAME ON NEW YEAR'S DAY.—An esteemed client, for whom we have solicited several patents (W. Chesterman, Esq., of Centralia, Ill.), accompanies his New Year's greeting with a box of partridges and prairie chickens—fine and luxurious specimens of western game fowls, for which he has our grateful acknowledgments. Our Senior also desires to express his individual thanks for a box of splendid grouse from an unknown source, but evidently from some person acquainted with the *taste* of the recipient.

THE SOUTHERN RURAL GENTLEMAN.—We invite the attention of our readers to an advertisement of this interesting journal in another column. We have no doubt that its general circulation throughout the country will contribute towards cementing the ties which should bind the agriculturalists of all sections of the Union in one great brotherhood.

ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING JANUARY 3, 1860.

[Reported Officially for the SCIENTIFIC AMERICAN.]

*** Pamphlets giving full particulars of the mode of applying for patents, size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

26,642.—Alexander Anable, of Middlesex, N. Y., for an Improvement in Corn Planters:

I claim the arrangement of the cog wheel, d, with intermediate spaces, d', in combination with the cam, c, spring, b, and seed-dropping rollers, E, substantially as and for the purpose specified.

[This invention consists in the peculiar arrangement of a cog wheel with intermediate spaces to operate in a toothed cam that is attached to the rotary shaft carrying the seed-dropping rollers in such a manner that, by the action of the cog wheel on the cam, the dropping rollers are turned up ready to receive the seed, and whenever one of the intermediate spaces of the cog wheel passes over the cam, the latter, together with the seed-dropping rollers, is caused to fly back by the action of a spring, and the seed cells discharge their contents; furthermore the dropping tubes are arranged on a vibrating shaft in such a manner that one is allowed to rise when the other one falls, and that both together can be raised and lowered at pleasure, so that they are not injured by stones or other obstacles.]

26,643.—Joseph K. Andrews, of Antrim, Ohio, for an Improved Combination of Seat and Cane:

I claim the cane as constructed for the purposes of a cane and seat, operating as described and for the purposes set forth.

26,644.—John A. Bassett, of Salem, Mass., for an Improvement in Manufacture of Hydro-carbon Gas:

I claim the continuous manufacture of an illuminating gas, by carrying the hydrogen and the vapor of a liquid hydro-carbon, formed in the manner described, through a retort which is intensely heated, for the purpose of producing a permanent illuminating gas.

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26,645.—James E. Boyle, of Brooklyn, N. Y., for an Improvement in Valves for Water-closets:

I claim combining with the body of the cock provided with the discharge pipe or nozzle, and having its cylindrical bore surrounded by an induction pipe, forming a surrounding chamber, with apertures in its bore, for the admission of water, as described, three piston valves on a movable stem, one above the discharge pipe and the other two below it, and bearing the relations to the series of apertures from the cylindrical bore in which they work, to the surrounding supply chamber, substantially such as described.

26,646.—Paul Boynton, of Canton, N. Y., for an Improvement in Magazine Fire-arms:

I claim the sliding charger, G, when used for the purpose and in the manner substantially as specified.

I also claim the method of loading by revolving the barrel and magazine, substantially as described in the specifications.

And also the method of loading by means of the charger, G, and magazines, F and D, in combination, substantially as described and set forth in the specifications.

26,647.—Thomas H. Burley, of New York City, for an Improved Dovetailing Machine:

I claim the employment or use of the rotary cutters, c, in connection with the rising and falling tilting bed, E, arranged substantially as and for the purpose set forth.

26,648.—Levi Burnell, of Milwaukie, Wis., for an Improvement in Match Safes:

I claim a match box or receptacle provided with a slot or opening at one side and at its bottom, substantially as and for the purpose set forth.

I also claim the inclined bottom, b, with the slots in the side and bottom of the box, for the purpose specified.

[The object of this invention is to facilitate the removing of the matches from the safe by the fingers, as the matches are required for use. The invention consists in constructing the safe or match receptacle with an opening or slot extending the whole hight of the box or receptacle, and a slot extending the whole width of its bottom, so arranged as to expose the matches and render them very accessible. The invention also consists in using, in connection with the slot or opening of the box or match receptacle, an inclined bottom for the same, so as to facilitate the removal of the matches when only a few remain on the bottom.]

26,649.—James Calkins, of Hudson, N. Y., for an Improvement in the Manufacture of Hydro-carbon Gas:

I claim attaching the eduction pipe of hydro-carbon blowers, chambers, pipes, flues, &c., for the purpose of heating the air after it leaves the blower or air chamber, and before it comes in contact with the hydro-carbon employed to produce light or heat.

26,650.—J. Theodore Chalot, of Buffalo, N. Y., for an Improvement in Ships' Tillers:

I claim the surface, P, of the forward end of straight tiller, E, in form representing a parallelogram, in combination with the sliding block, t t, and its friction rollers, double block, Y Y, lower and upper straps, c c, with center bolts located at the center of tiller, E, as described in the specification.

26,651.—David P. Chamberlin, of Hudson, Mich., for an Improvement in Fruit-gatherers:

I claim the arrangement of the lower jaw at right angles with the shaft, or nearly so, in combination with the open-work throat and the hose pipe for delivering the fruit at each cutting of the stem, so that the eye of the operator can constantly inspect the fruit at the side of and through the open throat; the whole being arranged and operating in the manner and for the purpose substantially as set forth.

26,652.—James S. Colvin, of Pittsburgh, Pa., for an Improvement in Steering Apparatus:

I claim the employment of an axle or drum that is provided with four grooved cones arranged as shown, for the purpose specified.

26,653.—Sumner Cooper, of Windsor, Conn., for an Improvement in Window-sash Supporters:

I claim my improved reversible-acting lock and balance, consisting of the double-headed knob lever, H, double inclined bolt, g g, oscillating spring, k, working against the stops, l l and m, strap, f, and spring drum, D, arranged and operating substantially in the manner and for the purpose shown and described.

I also claim the employment of the metallic strap or band, f, acting by its flexibility and elasticity to aid in starting the sash and requiring no grooving of the sash, in combination with the drum, D, and coiled spring, e, substantially as and for the purposes herein set forth.

26,654.—Matthew Cridge, of Pittsburgh, Pa., for an Improvement in Steam Valves:

I claim providing in such an arrangement (i. e., of a revolving and ascending and descending cup valve) the valve, A, and its seat, B, with port openings having inclined edges, 5 6 7 8, so that the steam is cut off by them variably and controlled by the governor, substantially in the manner and for the purposes set forth.

26,655.—Henry F. Cromwell, of Cynthiana, Ky., for an Improvement in Plows:

I claim the described arrangement of the cylindrically-curved frame timber or sheath, E, wing, C, flange, A, bar, B, slots, a and c, and bolts, D and D′; the whole being constructed and combined in the manner and for the purposes set forth.

26,656.—Francis Davis, of Lima, Ohio, for an Improvement in Cultivators:

I claim the arrangement of the plow, A B C C′, shovel, D or H, shovel, E, guard, c, and slotted adjustable conductor, G; all in the manner and for the purposes set forth.

[This invention consists in providing the shovel plow which runs close up to the young plants, with a side guard, so that the lumps &c., shall be thrown off from the plants. It also consists in providing the covering shovel with a curved conductor so that the soil which is thrown off from the young plants shall, after being deprived of its lumps, &c., be thrown back again close around the young plants. This arrangement of shovel corn plow is very useful, for it allows of the first shovel going very close up to the young plants without any danger of their being crowded or crushed by the soil and lumps falling upon them. It also insures the return of the soil to the young plants by the second shovel, in a loose, friable condition.]

26,657.—Perry Davis, of Providence, R. I., for an Improvement in the Construction of Boats:

I claim, first, The combination with the boat, A′, of spur wheels, G G, fixed to the hubs of wheels, C C, wheels, J J, adjustable shafts, F F, cranks, G′ G′, and compressed india-rubber springs, substantially in the manner and for the purposes stated.

Second, I claim the universal joint or gimbal for attaching the bow of the boat to the front axletree, when the same is so constructed as to combine with it an india-rubber spring, substantially in the manner and for the purposes set forth.

[This invention and improvement in buggy boats consists in combining an india-rubber spring in a novel manner with suitable gear wheels for operating the carriage wheels, which become propellers when the boat is in the water. The gearing is so arranged as to be disengaged when the boat is on land and the wheels are used as carriage wheels. It further consists in attaching the bow of the boat to the axletree of the front wheels by a universal joint which is constructed so as to admit of the introduction of an india-rubber spring for giving elasticity to the bow of the boat and preventing it being in any way injured in driving it over rough roads.]

26,658.—Horace H. Day, of New York City, for an Improvement in the Manufacture of Shirred Goods:

I claim the compound process described for manufacturing elastic shirred goods, consisting substantially of the two following operations, viz: the coating of the covering cloth with a thin coating of india-rubber or the vulcanizable compound of india-rubber and sulphur, or its equivalent, without the use of a solvent, preliminary to the application of the said coated cloth to strands, strips, or sheets of india-rubber, and then the application of the cloth so coated to strands, strips or sheets of rubber in an extended state.

I also claim, in combination with the compound process above specified, the vulcanization of the fabric produced thereby; the whole invention thus far specified being a compound process composed of three operations.

I also claim, in combination with the said first compound process, subjecting the compound fabric, prior to vulcanization and while in an extended state, to the action of fluted rollers or crimping it substantially as set forth; this part of my invention being a compound process or a combination of three operations.

26,659.—Leger Diss, of Oriskany, N. Y., for an Improved Lock:

I claim the sectional stop, A, overlapping as described, in combination with the bolt, B, spring, S, and the parts connected therewith, the arrangement and construction being substantially as set forth.

26,660.—A. W. Elliott and George S. Conkling, of Goshen, N. Y., for an Improvement in Railroad Switches:

We claim, first, The combination of the levers, H H′, with their pins, c c′ c″, movable cross-tie, E, jointed switch rail, F′, and sleeper, G, with recesses, a a, arranged substantially in the manner as and for the purposes described.

Second, We claim the levers, J J′, having inclined and oblique guides, g g, arranged in such a manner under the locomotive as to be under the control of the engineer, and so as to operate the switch in the manner described and represented.

26,661.—James R. Ender, of Trenton, La., for an Improvement in Inkstands:

I claim the hollow inverted cone, C, formed of two longitudinal parts, b b, connected to the cap, B, by joints, c c, and acted upon by the springs, d d, substantially as and for the purpose set forth.

[The object of this invention is to obtain a self-acting stopper, one that will admit of the pen being passed into the inkstand without any obstruction, and close as the pen is withdrawn without robbing the same of the ink.]

26,662.—Seth Fletcher and John P. Pike, of Bloomfield, Maine., for an Improvement in Corn-shellers:

We claim the combination and arrangement with the loosely hung presser plate, i, and revolving shelling wheel, h, of the follower plate, l, with its springs, m, hollow wheel shaft, F, and centrally arranged regulating screw, o, for operation, in relation to each other and unitedly essentially as specified.

26,663.—George E. B. French, of Washington, D. C., for an Improvement in Apparatus for Medical Topical Applications:

I claim the described adaptation of garments, &c., to the human body, constructed of india-rubber, gutta-percha or other suitable material, for the purposes set forth, and keeping up an even or required temperature, by the use of tubes introduced therein, and forming a part thereof, or any device substantially the same.

26,664.—Matthew Cridge and Samuel Wadsworth, of Pittsburgh, Pa, for an Improvement in Steam Engines:

We claim the arrangement of a set screw or its equivalent, passing through the center of the trunnion and butting against a transverse bar, H, at a point which is in one plane (or nearly so) with the port or valve surfaces, a a b b, of the cylinder and side pipe, in the manner substantially as described and for the purpose set forth.

We also claim the arrangement of the pins, i i, or other means for the support of the side pipe, F, in such a manner that the points of abutment are also in one plane (or nearly so) with the port or valve surfaces of the cylinder and side pipe, substantially as described and for the purposes fully set forth.

26,665.—Arthur Folsom, of Boston, Mass., for an Improvement in Tubular Submarine Tunnels:

I claim constructing a submarine roadway or tunnel in the manner described, that is to say, of sections of metal tubes connected as set forth, to form continuous portions, which portions are attached to each other substantially in the manner described.

26,666.—Samuel Gantz, of Beaver Creek, Md., for an Improved Invalid's Bedstead:

I claim the described new arrangement of canvas and mattrass, the latter being lowered while the former remains at rest, as described, for the purpose set forth.

26,667.—James Gardette and Henry Rance, of New Orleans, La., for an Improvement in Apparatus for Forming Vapor for Medical Purposes:

We claim the reduction of liquids into mist or vapor, at any degree of temperature without evaporation, by means of a centrifugal pump, or its equivalent, projecting fine jets of the liquid against disks set at any angle, substantially as described, so that the liquid may be respired with the atmosphere.

[This invention consists in the employment of a rotary wheel with hollow radial arms, terminating in very small orifices, through which the liquid is thrown in jets by centrifugal action; and it further consists in arranging, on the ends of independent radial arms (which are attached to a solid hub, rotating in an opposite direction to the first wheel), deflecting plates, against which the jets of liquid are thrown, which serve the purpose of dispersing and diffusing the particles of liquid throughout an apartment, so that they can be taken into the respiratory apparatus without inconvenience.]

26,668.—Heman Gardiner, of New York City, for an Improvement in Springs for Carriages and Railroad Cars:

I claim combining and arranging the coiled spring or blade, A, with the loose auxiliary semi-eliptical springs, H H, upon and around the central cylinder having upon its periphery the recesses to receive the loose springs; the whole operating together in the manner and for the purposes described.

26,669.—Dennis C. Gately, of Newtown, Conn., for an Improvement in the Manufacture of India-rubber Belting:

I claim the improvement described in the manufacture of machine beltings or bandings, composed either wholly or in part of india-rubber or gutta-percha, which consists in partially heating the same by placing them in contact with heated rolls or hollow cylinders, or in other suitable modes, previous to their being vulcanized, substantially in the manner and for the purposes described.

26,670.—John Gross, of Decatur, Ill., for an Improvement in Corn Planters:

I claim, in combination with the revolving shaft of a corn planter, having seed cells in its circumference, the slide, h, and levers, p k, for raising and disconnecting said shaft from the driving wheels, substantially in the manner and for the purpose described.

I also claim, in combination with the lifting devices, b p and k, the adjusting of the position of the seed cells in the revolving shaft, F, by hand, to make them drop the grain at exact points, independently of, and without turning either of, the gearing and driving wheels, viz.: by means of an index or hand, v, secured to said shaft, F, substantially in the manner and for the purpose described, and said shaft at the same time detached from the axle or driving wheel, as set forth.

26,671.—Wm. S. Habberton, of Mount Carmel, Ill., for an Improved Apparatus for Stuffing Horse Collars:

I claim, first, The clasp and taper pin, in combination with the collar block, substantially as and for the purposes set forth.

Second, The combination of the adjustable lever arrangement with the stuffing rod and collar block, substantially as and for the purposes set forth.

Third, The use, in combination with a collar box and stuffing rod, of an adjustable bending and shaping machine, constructed and operating substantially as described in the manner and for the purpose set forth.

[An engraving of this apparatus will soon appear in our columns.]

26,672.—Isaac Halloway, of New York City, for an Improvement in Axle Boxes for Vehicles:

I claim, first, An axle box arranged with chilled cast-iron balls, D, to fit into a cap, C, together with a groove, a, in the axle, A, an oil hole, r, in the center of the cap, C, and quadrant recesses, c, in the inside of the sleeve, substantially as and for the purpose specified.

Second, The arrangement of the recess, d, in the flange, e, in the front end of the axle, A, substantially as described, for the purpose of facilitating the operation of putting in and taking out of the balls, D.

[This axle box is furnished with balls of chilled cast iron which work in a recess, one-half of which is formed by the sleeve and cap of the axle box, and the other half by a semi-circular groove turned into the front end of the axle. The form of these pieces is such that those parts which form the bearings of the balls admit of being chilled. A small recess in the front end of the axle serves to admit the balls.]

26,673.—Joseph Harris, of Dorchester, Mass., for an Improvement in Railroad Car Axle Boxes:

I claim, in combination with an axle box in which the journal of the axle is inserted endwise, and in which the soft metal packing may also be inserted from the end, the front and back bearings, d e, and flanges, h k, for receiving the end thrust of the axle, and thus protecting the soft metal packing substantially as described.

26,674.—B. B. Howse, of Morrisville, Vt., for an Improved Clothes-dryer:

I claim two perforated hubs, H H′, movable upon the shaft, in combination with the swivel pulley, P, upon the shaft head cord, C, performing the double function of expanding and elevating the frame, and the self-acting ratchet eccentric, R, as applied to clothes-dryers.

26,675.—Randall Holden, of New York City, for an Improved Spring Bed Bottom.

I claim the extension link, G, and pins, c d, combined with the spring, D, and fastening, e b a, substantially as and for the purposes set forth.

26,676.—N. Homes, of Laona, N. Y., for an Improvement in Straw-cutters:

I claim the combination of the two knives, C E, arranged to operate substantially as and for the purpose set forth.

[This invention consists in combining with an ordinary reciprocasing knife and gate a larger knife, arranged to operate conjointly with the upper knife, for the purpose of facilitating the cutting operation.]

26,677.—Wm. H. Horstmann, of Brooklyn, N. Y., for an Improvement in Laying Telegraph Cables:

I claim the floats, q, attached and arranged substantially as described, for the purpose of a graduated action, substantially as and for the purposes set forth.

26,678.—Jean Jaques Huber, of Geneva, Switzerland, for an Improvement in Jewelry:

I claim forming articles of jewelry of a series of movable and adjustable pieces, so that the aspect and appearance of the said articles may be changed at pleasure, substantially as set forth.

26,679.—L. S. Hurlbert, of Painesville, Ohio, for an Improved Double-seaming Machine:

I claim, first, The rotating head, operated in the manner and by the means described, so as to produce a lateral pressure on the seam, in combination with the mode of adjusting the "direct line" arrangement referred to by means of the shank, socket and set screw, as described, together with the adjustable standard, R, substantially as specified and for the purposes set forth.

Second, I claim the former, A′, with its raised or convex border, C′, and tapering edge, B′, in combination with the rotary head, D′, having its edge constructed as shown, to be used in conjunction with the arrangement in my first claim, for the purpose of double-seaming raised or convex work, as described and shown.

26,680.—Enoch Jacobs, of Cincinnati, Ohio, for an Improvement in Truss Frames for Bridges:

I claim the combination of the upper and lower double angle-iron rails with the tubular braces and tie rods, and the oblique interlocking braces, to form a bridge truss; all arranged and operating in the manner substantially as set forth.

26,681.—Barton H. Jenks and William A. Tuttle, of Philadelphia, Pa., for an Improvement in Cotton Gins:

We claim the arrangement of stationary metallic bands, A A A A A, &c., arranged concentric with and around either the whole or a part of the circumference of the gin cylinder, and just above the end of the gin teeth, in the manner and for the purpose specified.

26,682.—Henry R. Kinney, of Portsmouth, Ohio, for an Improvement in Cultivators.

I claim the arrangement of the furrow plows, D D D′, adjusting devices, E E E, and frame, A B C, in the manner set forth.

[This invention consists in arranging the plows, which may be of the ordinary kind, diagonal with the frame for supporting them, so that, as the plows are drawn through the ground, two slices will be thrown to the left, and one will be turned to the right, which latter will be covered by the two succeeding slices; and in this way furrows are formed between the furrow slices, which, in impervious subsoils, will let the superfluous water run off, from which it is conducted, by proper channels, into the ditches.]

26,683.—Henry F. Knoderer and Levi F. Knoderer, of Chillicothe, Ohio, for a Composition for Removing Incrustation of Steam Boilers:

We claim the application of a compound of alum, glue, wood ashes and wheat bran, prepared and applied as specified, to prevent the deposition and accumulation of lime, known as "lime scale," upon the interior of steam boilers and pipes, of whatever kind, as specified and substantially as set forth.

26,684.—Thomas Leavitt, of Malden, Mass., for an Improved Second Anchor Shackle:

I claim, as an improvement in the apparatus herein before referred to as patented, the combination of the roll, a or b, with the cheek, e, substantially in the manner described for the specified purpose.

26,685.—Uri Lee, of Burlington, Mich., for a Composition for Mixing with Paints:

I claim the described composition or paint vehicle, mixed or compounded in the proportions stated.

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26,686.—Moses W. Lester and Max Hjortsberg, of Chicago, Ill., for an Improvement in Apparatus for Heating and Ventilating Buildings:

We claim the arrangement of the ventilating pipes, F, extending down to the bottom of the furnace drum, B, and chimney flue, A, in combination with a furnace which is constructed with a central fire-box, K P L, radiating drum, H H G G I I O, and air-circulating and heating-chamber, extending up beyond the ventilating drum, in the manner and for the purposes described.

[This invention consists in combining with the heater or furnace an arrangement of vertical pipes, which lead from apartments and pass up through the furnace and communicate with the chimney piece. By this arrangement, while hot air is being introduced into apartments, cold or impure air is being drawn from the same. This appears to be a very good invention.]

26,687.—Austin Leyden, of Atlanta, Ga., for an Improvement in Sewing Machines:

I claim the spool-holder, constructed and applied in combination with the bed, H, substantially as described.

[The object of this invention is to adapt the lock-stitch sewing machine to the use of the locking thread direct from an ordinary spool of any reasonable size, without re-winding; and, to this end, the invention consists in a certain mode of applying the spool in a stationary, or nearly stationary, spool-holder, and in certain contrivances operating in combination with such spool-holder, to extend the loop of the needle thread and pass it over the said holder.]

26,688.—Geo. B. Lewis, of Moreau Station, N. Y., for an Improved Milk Pan Rack:

I claim the use of the frames, A A, connected by joints, c, in connection with the supplemental frames, E E, and with or without the horizontal frames, B C D, substantially as and for the purpose set forth.

[The object of this invention is to obtain a rack for holding milk pans, that will be light, strong and durable, occupying but little space, and still having a large holding capacity, and better calculated for the intended purpose than any previously constructed. The invention consists in having two frames provided with horizontal parallel slats, and connected by joints at their upper ends, said frames being provided with a horizontal slatted platform, and also with adjustable side frames; the whole being so arranged as to effect the desired object.]

26,689.—Francis B. Lowthorp, of Trenton, N. J., for an Improvement in Pivot Bearings:

I claim interposing between the plate, C, of a turntable, swing bridge, or other like object, and the step or foundation plate, A, a pivot, B, constructed and arranged, in respect to the plates, substantially as described, so as to form a center on which the object connected to the plate, C, may roll and balance itself, and so as to present, in contact with the plate, A, a self-lubricating surface.

26,690.—Geo. B. Markham, of Mead's Mills, Mich., for an Improvement in Seeding Machines:

I claim, first, The arrangement of the sleeve, E, on the axle of the driving wheel, with the ratchet wheel, e, and cams, d, or their equivalents, in combination with the pawl, g, dog, i, and pointed rod, j, or its equivalent, substantially in the manner and for the purpose specified.

Second, The arrangement of the reversible seat, E, with two bottoms, l l', substantially as described, in combination with the hand lever, K, and seed slide, J, whereby the dropper is enabled to face the rows is whatever direction the machine may run, and to adjust the seat to a convenient position for operating the lever.

[The driving wheel of this machine is so arranged that it can be thrown out of gear with the working parts at any instant, so that the machine can be backed without injury to the dropping mechanism. The dropper's seat is reversible, so that the operator can make the same to face either way, and that he is enabled to see the rows both ways, and to drop at the proper time. The hoes are connected to the frame, by means of two arms, in such a manner that the angle at which they cut can be adjusted according to the nature of the ground, and to the depth to which they are expected to work.]

26,691.—J. H. Masker, of Newark, N. J., for an Improved Machine for Turning Hat Blocks:

I claim the oscillating frame, B, and the devices for altering the shape of the block from that of the pattern, constructed, combined and arranged substantially as set forth.

26,692.—John McManus, of New York City, for an Improvement in the Ventilation of Hats:

I claim a ventilating piece composed of india-rubber or gutta-percha, having a smooth surface, next the head, and grooves or openings next the brim, and firm enough not to crush or close up said openings, as represented and for the purpose set forth.

26,693.—John B. McMunn, of Port Jervis, N. J., for a Lubricating Compound:

I claim the composition made of the proximate acid principles of the herein-named ingredients and alkali, by combining them together in the manner and proportions as substantially described, and for the purposes set forth.

And I also claim the rejection of the underlye in the process, and the substitution and mixture of water with the residual mass, to reduce it to a thinner consistency for practical use, substantially as described and set forth.

26,694.—A. P. Merrill, Jr., of Natchez, Miss., for an Improvement in Hoop Locks:

I claim the plates, B, provided with a slot, b, attached to one end, A', of the hoop, the hook, C, projecting from the inner side of the plate, in connection with the perforated end, A, of the hoop, substantially as and for the purpose set forth.

[This invention consists in attaching to one end of the hoop a metal plate provided with a slot, and having a hook secured to it in such a relative position with the slot that the upper end of the hoop, which is perforated, may be passed through the plate and either of its perforations fitted on the hook. The invention is designed for securing together the ends of metal bale hoops, more especially the hoops of cotton bales.]

26,695.—F. Misner and P. A. Misner, of Fox, Ill., for an Improvement in Cultivators:

We claim the arrangement of the beam, h, wings, m, transverse pieces, E O, handles, H, slotted standard, 2, legs, u, shovel, R, castings, C B, brace rods, b, forked strap, G, forked rod, x, and transverse timber, s; the whole being constructed and used together in the manner and for the purpose described.

[This invention consists in a particular arrangement of an arch-shaped guard between two sets of shovel plows, in such a manner that the plowing may be performed on both sides of a row without any danger of breaking down the young plants by clods, &c., falling on them. The guard perfectly shields the plants. This is a good cultivator.]

26,696.—Albert Morehouse, of Farmer, N. Y., for an Improvement in the Gates of Water Wheels:

I claim the combination with the spout, 5, and with each other, of the gates, 6 and 7, inclined and arranged as described for the purposes set forth.

26,697.—Campbell Morfit, of New York City, for an Improvement in Substitutes for Wax:

I claim the use of Japan vegetable wax, in combination with paraffine, in the manner and for the purposes set forth.

26,698.—John Murphy, of New York City, for an Improvement in Treating Waste and Inferior Gums:

I claim the process described for manufacturing the vulcanizable compounds of vulcanizable gums, consisting of the following operations, viz.:—

First, The manufacture of hard stock of the vulcanizable gum by blending it with sulphur, or its equivalent, and vulcanizing the compound until it is hard.

Second, The reduction of the hard stock to powder.

Third, The formation of a compound of the ground stock and raw gum by blending the two together.

Fourth, The vulcanization of the compound formed by the preceding operation, the several operations constituting the process being effected in the order stated.

26,699.—Thos. Newcomb and G. W. Byrd, of Smith's Fork, Tenn., for an Improvement in Cotton Cultivators:

We claim the arrangement and combination with the plows, G G, of the central beam, A, double-acting hoe, F, cog pinions, c d, crank, g, rockshaft, i, and pitman, h, all in the manner set forth for the purpose specified.

26,700.—Daniel Nichols, of Onargo, Ill., for an Improvement in Corn Planters:

I claim the arrangement of the rolling cutters, F, guards, G and metal strips, I, in combination with the runners, D, which are hinged to the frame, A, substantially in the manner and for the purpose specified.

[This machine is arranged with rolling cutters attached to the runners which draw the furrows so as to pass along before the same, and that they, in combination with guards attached to said runners, keep the furrows clear of sod and other obstructions. Metal strips secured to the rear ends of the runners protect the corn from being blown off by the wind as it drops. The runners are hinged to the frame, and the whole is so arranged that a person, by stepping on the rear end of the frame, can raise the working parts from the ground. The seed slide is connected with the driving axle in such a manner that the dropping of the seed depends entirely upon the speed of the team, and that the dropping mechanism can be disconnected whenever it is desirable. The driver's seat rotates on a vertical pivot, enabling the driver to face either way.]

26,701.—Septimus Norris, of Philadelphia, Pa., for an provement in Steam Boilers:

I claim the employment of the removable water wall, D, fitting closely to the bottom and sides of the fire chamber, substantially in the manner described for the purposes set forth.

26,702.—M. Obermiller, of Tiffin, Ohio, for an Improvement in Railroad Car Brakes:

I claim the combination of the spring detent, f, with levers, a E and H, projection, h, on draw bar rod, b, and spring, c, substantially as and for the purposes set forth.

26,703.—Edward Patric, of Livingston, N. Y., for an Improved Composition for Soap:

I claim the composition of matter together with the process for making the same, substantially as the same is set forth in the specification.

26,704.—Nelson Peck, of Wilmington, N. Y., for an Improved Road-scraper:

I claim attaching the wheels, E E, to the head or stock, A, to which the scoop, C, is secured, substantially as shown, so that the same may be adjusted to admit of the raising and lowering of the head or stock, for the purpose set forth.

[The object of this invention is to facilitate the operation of the machine as regards the depositing or leaving of the load and also to lessen the draught, so that the work usually performed by scrapers may be executed with greater facility and with less labor, favoring both the operator or attendant and the draught animals.]

26,705.—Walter Peck, of Winnebago, Ill., for an Improvement in Pumps:

I claim the construction or arrangement of the valves, c e f and k, within the cylinder, A, in combination with the hollow piston, A2, and hollow piston rod, B, the whole constructed to operate as specified.

26,706.—Geo. W. Penniston, of North Vernon, Ind., for an Improvement in Presses:

I claim the clevis, F2, constructed substantially as described, in combination with the bar, F', and key, F3, for locking and releasing the doors of the press box, as specified.

I claim fastening the block, I', to the rockshaft, H2, so as to relieve it of some of the pressure in working the press, as set forth.

26,707.—Louis Planer, of New York City, for an Improvement in Grooved Pulleys:

I claim, as a new article of manufacture, a grooved pulley, A, arranged with tangential ridges, c, on the sides of the groove, b, as and for the purpose specified.

26,708.—Ira C. Pratt, of Morton, Ill., for an Improvement in Draining and Pipe-laying Machines:

I claim pivoting the mole point on the adjustable cutter, D, for allowing lateral motion in said point and the mole attached thereto, substantially as described.

I also claim the screw, l, or its equivalent, in combination with the mole, I K K K', for securing the pipe in such a manner that it may be drawn within the perforation made by the mole, I, substantially as described.

26,709.—C. L. Pyron and Robert Bruce, of Manchester, Tenn., for an Improvement in Machinery for Changing Motion:

We claim the combination of segmental rack, E, with lever or beam, K, in combination with clutch wheels, G G', and spur wheels, D D', arranged and operating in the manner and for the purposes set forth.

[This invention consist in a novel arrangement of loose and fixed spur wheels upon parallel shafts, with a segmental rack, from which rack projects out a suitable distance a lever or working beam, so that by elevating and depressing said beam or vibrating it, a continuous rotary motion will be transmitted to the shafts carrying the spurred gearing, and this motion is communicated to various kinds of machinery by connecting rods, belts and pulleys, or other suitable contrivance, whereby a rotary motion can be obtained from the motion of the waves.]

26,710.—Thaddeus S. Scoville, of New York City, for an Improved Clothes Frame:

I claim the hinge plates, C C, and bolts, D D, arranged in combination with the support, A, and arms, B B, substantially in the manner and for the purposes specified.

26,711.—Frederick Schutte, of Philadelphia, Pa., for an Improved Vegetable-cutter:

I claim the box or hopper, C, having an inclined plane, n, and being arranged and rendered adjustable on the frame, A, in respect to the cutting wheel, C, as and for the purpose set forth.

26,712.—Philander Shaw, of Boston, Mass., for an Improvement in Heels for Boots and Shoes:

I claim the heel described as being made of compressed wood, which is first filled with resinous or oily or other equivalent matter, for the purpose set forth.

I also claim the holding band, c, arranged to be fixed upon and removed from the sole, in combination with the metallic plate, b, and heel, a, substantially as set forth.

26,713.—Joseph Singer, of Cleveland, Ohio, for an Improved Hose Coupling:

I claim the adjustable ring, D, arms, E E, and eccentric levers, F F, in combination with the semi-circular strip, G, all applied and operating in the manner and for the purposes set forth.

56,714.—Joseph W. Stickler, of Orange, N. J., for an Improved Vegetable-cutter:

I claim the series of cutting knives, in combination with the projecting blocks upon the cover, arranged in the manner and for the purposes substantially as described.

26,715.—Nelson P. Stratton, of Waltham, Mass., for an Improvement in Watches:

I claim the arrangement wherein the main ratchet wheel, C, is disposed between the main gear wheel and the barrel, and made to serve as a head to the barrel and to support the winding arbor and its spring click, as described, the maintaining power-spring being arranged between the gear and ratchet, as specified.

26,716.—Charles D. Sutton, of Kensico, N. Y., for Improved Callipers:

I claim the combination of the arms, 1 and 2, with the spring, 11 and 10, and the folding arm, 7, substantially as and for the purposes set forth.

26,717.—John Sutton, of New York City, for an Improvement in Apparatuses for Evaporating:

I claim so applying a steam coil, or other heater, in combination with an evaporating vessel, that it may be independent of the vessel in its action, and may float in and rise or fall with the surface of the liquid in the vessel, substantially as and for the purpose described.

I also claim the employment, in combination with a so-applied heater, of means of elevating it wholly above and depressing it wholly below the surface of the liquid as may be desired, substantially as and for the purposes specified.

26,718.—J. V. Taylor, of Dixon, Ill., for an Improvement in Plows:

I claim the combination, with a cultivator plow, of a shield, E, when said shield, in its transverse section presents a cima reversa or wave shape, and is perforated and suspended at the side of the cultivator by means of springs, a H, and an adjustable clip, G, substantially as and for the purposes set forth.

[This invention relates to a shield attachment for plows, so applied and arranged as to protect young growing plants, preventing them being injured by the plows, and the earth cast up by it during the process of cultivation. The invention is designed to be applied solely to cultivators or shovel-plows, such as are used in cultivating growing crops. In plowing near small plants the plow is liable to cast up stones and lumps of earth and deposit them on the plants, thereby greatly injuring, and in some cases destroying them; and in cultivating crops in clayey soils which contain many lumps, consequent on the baking of the soil under the influence of the sun, it is impossible to plow close to the plants without injuring them. By this invention this difficulty is fully obviated.]

26,719.—Wm. D. Titus, of Brooklyn, N. Y., for an Improvement in Medicated Pads:

I claim filling the pads, AA', of a belt or girdle with the compound, proportioned and applied in the manner and for the purpose substantially as described and shown in the drawings.

26,720.—Jonathan T. Trotter, of New York City, for an Improvement in Finishing Felt Rubber Goods:

I claim the method of finishing or fixing the felt-like coating of powdered flock, ground cork, or other similar fibrous material, upon the surface of a previously water-proofed fabric, by means of a roller partially submerged in a solution of, or solvent of any vulcanizable gum, so that, as the submerged parts of the roller are raised from the bath, it will deliver the solution or solvent upon the flocked surface of the fabric in an even and uniform sheet, to fix the flock into the surface of the fabric smoothly and uniformly together to give it a cloth-like textile appearance.

26,721.—S. T. Trowbridge, of Decatur, Ill., for an Improvement in Canes for Physicians:

I claim, as a new and useful article of manufacture, a physician's cane, constructed with a semi-tubular vial receptacle, substantially as and for the purpose set forth.

26,722.—James Tucker, of Washington, D. C., for an Improved Stopper for Chain Cables:

I claim the guiding staple or ring in combination with the grooved stock and scored pawl, arranged to operate substantially as described.

26,723.—Richard Vose, of New York City, for an Improvement in Car Springs:

I claim making the metallic ring or circle with a central groove for the purpose of securing the felt firmly in its place, when combined with the india-rubber disks, that is to say, in the combination of the centrally grooved ring or circle with the layers of felt and rubber, arranged and operating together as described.

26,724.—Samuel Wethered, of Baltimore, Md., for an Improvement in Hot Air Furnaces:

I claim the combination of the inclined fire-box, side cold air doors or registers and auxiliary side draft and cleansing passages, with a furnace constructed with a series of hollow arches, which form a zig-zag flame passage from the fire-box to the chimney flue and communicate by branch tubes with a hot air reservoir, all in the manner and for the purposes set forth.

26,725.—John C. Wilkins, of Fox Chase, Pa., for an Improved Cabbage-cutter:

I claim the movable holder blocks, C', and securing keys, e, in combination with the adjustable radiating knives, f, rotary face plate, D, and horizontal hopper, B, the whole constructed to operate as and for the purpose set forth.

26,726.—Henry Wilverth, of Caseyville, Ky., for an Improvement in Coal-excavating Machines:

I claim, first, The arrangement and combination of the frames, A B C, together with the toothed racks, b, and shafts, c, or their equivalents, and with the screw shaft, h, arms, E, cutter head, D, and toothed arc, c', or its equivalent, substantially in the manner and for the purpose specified.

Second, The cutters, h', arranged substantially as described, in combination with the disks, a', springs, j', and pivots, i', or their equivalents, for the purpose set forth.

26,727.—James Young, of Boston, Mass., for an Improved Pen Rack:

I claim the described pen rack with a drawer, B, in the base, A, substantially as described.

26,728.—G. Frederick Zimmann, of Philadelphia, Pa., for an Improved Ironing Table:

I claim the combined arrangement of the ironing board, B, with the self-adjusting tie, N, upon a supporting frame adapted thereto, so as to operate together in the manner and for the purposes set forth and described.

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27,729.—John V. S. Adriance and Joseph W. Clark (assignors to J. V. S. Adriance and Benjamin G. Kelly), of Buffalo, N. Y., for an Improved Refrigerator:

We claim the combination of a refrigerator, constructed in the manner set forth, with a provision chamber, when said provision chamber is provided with double glass walls or sides, with an air space between said walls, the two being so arranged and constructed that the provisions within will be exposed to view, while a current of cold air from the ice-box is being constantly circulated through the provision chamber, substantially as specified.

26,730.—Wm. C. Allison (assignor to himself and John Murphy), of Philadelphia, Pa., for an Improvement in City Railroad Cars:

I claim the arched reflector, H, its plate of glass, II, and the lamp, G, when arranged on and adapted to the overhanging portion, D, of the roof, in respect to the window, f, and the other windows of the car, substantially as and for the purpose set forth.

26,731.—Solomon N. Carvalho (assignor to himself and L. K. Bowen), of Baltimore, Md., for an Improved Apparatus for Superheating Steam:

I claim, first, Subjecting steam, while undergoing the superheating process, to the action of the metals named, as and for the purposes set forth.

Second, I claim the arrangement of the pipes, the valves and the retort, or its equivalent, for conveying from, heating and returning to the boiler, or its connecting steam dome, the steam, substantially as described.

26,732.—L. R. Dreysel (assignor to himself and James E. Blythe), of St. Louis, Mo., for an Improvement in Ruling Machines:

I claim the application of the pen-holder, D, to the pen-holder, B, substantially in the manner described for the purpose specified.

26,733.—Thomas Fry, of Brooklyn, N. Y., and Charles A. Seely, of New York City, assignors to William Campbell, of Jersey City, N. J., for an Improved Mode of Backing-up Pictures on Glass:

We claim the process of using wax, stearine, spermaceti, or other substances or compositions substantially the same, for the purpose of backing-up, and as a medium of color for the chemitype and other pictures or designs on glass.

26,734.—Theodore P. Gould, of Niagara Falls, N. Y., assignor to Stephen V. R. Watson, of Buffalo, N. Y., for an Improvement in Breech-loading Fire-arms:

I claim the relative arrangement of the powder magazine, A, the ball magazine, C, and the sliding breech, D, for the purposes of a breech-loading gun, substantially as set forth.

I claim so arranging the valve, R, in relation to the barrel, B, and stock, G, that when the barrel is unscrewed in the act of loading, the said valve will open automatically, and when the barrel is turned back to its place the said barrel will close automatically and fit tightly over the mouth of the tube, thus preventing all danger of igniting the powder in the magazine by the discharge of the gun, substantially as described.

26,735.—John S. Grav, of Hartford, Conn., assignor to himself and David Lyman, of Middlefield, Conn., for an Improvement in Washing Machines:

I claim the combination of the rollers, C C, with the turning frame, B, having proper forked or slitted projections to secure the roller frame to the tub or box, when arranged and operating substantially in the manner and for the purpose described.

26,736.—James A. Hamer, of Reading, Pa., assignor to himself and Norris Maris, of Kimberton, Pa., for an Improvement in Brick Molds:

I claim, first, The interposition of vulcanized rubber, or its equivalent, between the ends and sides of the mold, substantially as and for the purposes set forth.

Second, The combination and arrangement of the cams, f f, levers or arms, E E, inclines, a, and grooves, b, with the sides and ends of the mold, substantially as and for the purposes set forth.

Third, The secondary cams, g g, in combination with the outer division pieces of the mold, as and for the purposes set forth.

26,737.—Peter Hinds (assignor to himself and W. Van Name), of Cedar Run, Pa., for an Improvement in Cant Hooks:

I claim attaching or connecting the hook, C, to the handle, A, by means of the socket, D, the hook being provided with the curve, a, at one end and the ledges, c, at its center, substantially as shown, to admit of the two adjustments of the hook, for the purpose specified.

26,738.—Thos. E. Hunt (assignor to Hunt Brawner & Co.), of Louisville, Ky., for an Improvement in Grinding Mills:

I claim the combination of spring, o o, with the cutting blades, M, in the manner and for the purpose substantially as set forth.

26,739.—Franklin W. Willard, of New York City (assignor to E. G. Allen, of Boston, Mass.), for an Improvement in Coal Retorts:

I claim, first, The construction of coal oil retorts with internal false or extra heads at either end of the retort, and held at proper distances from the head proper by means of stays or studs, as described, the intervening space between each of the false heads and the end of the retort being filled with clay or other non-conducting material, substantially in the manner and for the purposes specified.

Second, The use of the circular plate, r, hung upon the false head, p, and operating as described.

26,740.—Marcus A. Winham (assignor to J. B. Low and F. Smith), of San Juan, Cal., for an Improvement in Valve Chests for Hydraulic Mining:

I claim the arrangement for controlling by means of a chest or distributor, provided with suitable gates, valves or stopcocks for the purpose of cutting-off the water employed in hydraulic mining, substantially in the manner as described and set forth in the specification.

26,741.—John Wright (assignor to James Chesterman), of Sheffield, England, for an Improvement in Tempering Steel. Patented in England Oct. 16, 1857:

I claim preparing strips of steel for hardening and tempering by drawing the same through a metal or fire-clay tube, heated in a furnace, constructed and arranged to operate substantially in the manner and for the purpose set forth.

EXTENSION.

W. H. Robertson (formerly of New London, Conn.), of Havana, Cuba, for an Improvement in Mattresses. Patented Dec. 17, 1846; ante-dated January 2, 1846:

I claim, first, Making matresses by confining within a ticking or tickings (made of any material) layers of glazed cotton batting or unglazed batting with glazed paper or cloth interposed, substantially as described, to prevent the fibers of the different battings and those of each batting from matting together, as described.

And, second, Confining the compressed cotton between two cloths, connected together by means of a cord or cords, when this is combined with ticking or outer covering, substantially as above described, whereby the cotton can be retained by the corks and cloths, in a state sufficiently compressed to admit of its being easily introduced in the ticking, or removed therefrom, as described.

RE-ISSUES.

Amy Coes, of Worcester, Mass., for an Improved Screw Wrench. Patented Aug. 16, 1853:

I claim the use of two screws in working the movable jaw of a wrench, so that said jaw will travel with the united velocities of said two screws, substantially as set forth.

Cyrenus Wheeler, Jr., of Poplar Ridge, N. Y., for an Improvement in Grain and Grass Harvesters. Patented Dec. 5, 1854:

I claim, first, In combination with the bar, II, and finger-bar, the intermediate shoe, M, hinged to said bar, II, substantially in the manner and for the purpose set forth.

Second, I claim, in combination with the hinged bar, II, a lever that when released allows said bar to freely swing around its pivoted points, and when fasted holds said bar firmly in its adjusted position, as described.

Third, I claim the shoe, M, both as a hinge and a support to the cutter bar, substantially as described.

Fourth, I claim the socket or recess, n, in the shoe, M, for the reception of the finger-bar, substantially as described.

Fifth, I claim, in combination with a finger-bar, hinged at one of its ends to an intermediate piece, also hinged to the main frame, an elevating and supporting caster or wheel for carrying that end of the machine, when adjusted for reaping or mowing, substantially as described.

Sixth, I claim the combination of a brace or support, t, on the shoe, and a similar brace and support, u, on the bar, II, for resisting the strain on the finger-bar when reaping, substantially as described, or for transporting it from place to place.

Seventh, I claim the flexible connection for elevating the outer end of the finger-bar, substantially as described.

Cyrenus Wheeler, Jr., of Poplar Ridge, N. Y., for an Improvement in Grain and Grass Harvesters. Patented Dec. 5, 1854:

I claim, in combination with the main frame of a grass harvesting machine, a finger-bar, so hinged by one of its ends only to the grain side of the main frame as that said finger bar as it is advanced by means of its hinge shall be free to rise above and fall below the plane on which the carrying or driving wheels are passing, substantially as described.

Cyrenus Wheeler, Jr., of Poplar Ridge, N. Y., for an Improvement in Grain and Grass Harvesters. Patented Dec. 5, 1854:

I claim, first, So hinging a finger bar by one of its ends only to the main frame, as that it may oscillate or turn around its longitudinal axis for the purpose of raising or lowering the points of the fingers, to adapt the machine to the condition of the ground or of the crop to be cut, substantially as described.

Second, I claim, in combination with a finger bar hinged by one of ends only to the main frame, so that the points of its fingers can be raised or depressed, a connecting rod or pitman in two pieces, and so connected that one piece can turn independently of the other, for the purpose of preventing the cramping or torsion of said rod, when the finger bar is turned, substantially as described.

Cyrenus Wheeler, Jr., of Poplar Ridge, N. Y., for an Improvement in Grain and Grass Harvesters. Patented Dec. 5, 1854:

I claim a short finger-bar, so hinged by one of its ends only to an arm, brace or support, that is in turn hinged to the main frame in or near the line of the finger-bar, as that said finger-bar may rock or roll in the line of its length as well as rise and fall in a line transverse thereto, by being simply drawn over the ground, substantially as described.

Cyrenus Wheeler, Jr., of Poplar Ridge, N. Y., for an Improvement in Grain and Grass Harvesters. Patented Dec. 5, 1854:

I claim, in combination with a cutter bar, the shoe, M, and its hinge and a supporting piece, and its hinged connection to the main frame, the arranging of the pivots of said hinges at right angles to each other, and in or near the line of the finger-bar, as described.

Cyrenus Wheeler, Jr., of Poplar Ridge, N. Y., for an Improvement in Grain and Grass Harvesters. Patented Dec. 5, 1854:

I claim the use of two hinges, substantially as described, whereby the finger beam may be folded to the main frame in the manner essentially as set forth.

Cyrenus Wheeler, Jr., of Poplar Ridge, N. Y., for an Improvement in Grain and Grass Harvesters. Patented Dec. 5, 1854:

I claim the combination of the drooping main frame, the loose tongue, and a hinged finger-bar, substantially as and for the purpose described.

Jesse Urmy, of Wilmington, Del., for an Improvement in Grain and Grass Harvesters. Patented July 24, 1855:

I claim, first, In combination with the driving wheel placed inside the gearing as above described, the angular tongue, for preventing side draft, and at the same time allowing the horses to walk on the side of the standing grass or grain.

Second, I claim the above-described use of the balanced dogs, b b, under the driver's feet, for throwing the cutting apparatus in and out of gear.

Third, I claim making the parting and gathering board, f, hinged and adjustable, as set forth.

Fourth, I claim regulating the size of the sheave by means of the several ranges of gearing, p p, within the driving wheel, in combination with the adjustable pinion, r, as set forth.

Jesse Urmy, of Wilmington, Del., assignor to David M. Osborne, of Auburn, N. Y., for an Improvement in Grain and Grass Harvesters. Patented July 24, 1855:

I claim, in combination with a closed guard, the projections on the top and bottom of the cutter bar, for the purpose of clearing out the grass and other matter which tends to lodge in said guard, substantially as described.

DESIGNS.

James Meyer, Jr., of New York City, for a Design for a Trade-mark.

N. S. Vedder and A. Murray (assignors to Potter & Co.) of Troy, N. Y., for a Design for Doors of Cooking Stoves.

N. S. Vedder and E. Ripley (assignors to Potter & Co.) of Troy, N. Y., for a Design for Side Plates of Box Stoves.

N. S. Vedder (assignor to Potter & Co.), of Troy, N.Y., for a Design for the Side Plates of Stoves.

N. S. Vedder (assignor to Potter & Co.), of Troy, N. Y., for a Design for the Doors of Cooking Stoves.

Literary Notice.

RURAL REGISTER. S. Sands & Mills, publishers, Baltimore, Md.

This most excellent and well-conducted monthly is devoted to agriculture, horticulture, rural life and general news; it is always brimming full of valuable information on the above topics.

Notes & Queries

S. S., of Pa.—All paint containing oil is liable to give off an offensive smell when applied to steam pipes. Black lead, mixed with a little turpentine, is a good coating for such pipes The best way to paint floors is to give them three coats of any of the common paints, mixed with boiled drying oil, and allow each coat to dry perfectly.

ALFRED, of ——.—About a year ago a paper was read before the Society of Arts, in London, which stated that the British navy at that time consisted of 637 fighting ships of all classes, of an aggregate burden of 605,220 tuns, with a steam power equal to that of 100,000 horses, and involving a cost of $140,000,000.

I. P. C., of N. J.—We thank you for sending us a club of subscribers. In regard to binding the SCIENTIFIC AMERICAN, we would state that if you should send us a thousand volumes for this purpose, we could not bind them as we are now doing in cloth for less than 50 cents. The binding is much superior to any other hitherto done by us.

I. B. S., of N. Y.—The mechanical part of the Patent Office Report for 1858 is published. Your only way to procure the report is to address your member of Congress. The Commissioner of Patents has only enough to supply the legitimate demands of the Office.

L. P., of N. Y.—Water led through a 6-inch pipe to a distance of 150 rods, from the foot of a hill, where it has a fall of 175 feet, will throw a higher steam than any fire engine in this city. With such a fall, and water flowing full through a 6-inch pipe, the power would be about 21-horse.

S. C., of Ill.—We are not acquainted with any substance which can be used as a substitute for borax in welding iron and steel. Its peculiar office seems to be that of a cementing flux, which promotes the union of the red-hot surfaces when sprinkled upon them before they are hammered together.

I. L., of N. Y.—You can make a small quantity of the soluble glass for experiment by boiling ground glass in a strong solution of caustic potash. The latter you can obtain where you live more conveniently than caustic soda. The boiling must be continued for a long period, and a close vessel should be used for the purpose to obtain a high degree of heat.

S. W. S., of N. Y.—Steel and iron are united together in anvils by melting the steel and casting it upon the iron in a proper mold; the iron is poured in first, then the steel. Great care must be exercised in pouring in the steel or a proper union of the metals will not be effected.

I. W. H., of N. Y.—A cement made of plaster-of-paris and alum water is very good for filling holes in millstones. It becomes very hard if suffered to dry before it is used.

H. R., of R. I.—To double the speed of a locomotive, it requires four times the power. The power increases according to the square of the velocity; and, in practice, it has been found that, to double the power of an engine, four times the amount of fuel must be consumed.

I. I., Jr., of Conn.—You will find the test for experiments with water wheels at Philadelphia described on page 67, Vol. I. (new series), SCIENTIFIC AMERICAN, in a communication from Mr. Birkenbine, the chief engineer of the water-works.

I. A. H., of Mo.—Ure's "Dictionary of Arts" gives a very full description of paper-making, as practiced several years ago; but it does not come up to the practice of the present day, nor is there any printed work which does so

T. D., of N. Y.—The only way known to us to make artificial stone of close texture, by molding and without burning, is by the use of soluble silicates and sand ground to powder. Professor Hardinge, of Woodland, on the Bloomingdale road, near this city, can give you information on this topic

A. M., of N. Y.—You cannot use the india-rubber backing for teeth when another person has a patent for such an application, even though you should have the india-rubber vulcanized by the patentee for the vulcanizing process. The inventor of the vulcanizing process himself has no right to such an application; it belongs to another patentee.

Money Received

At the Scientific American Office on account of Patent Office business, for the week ending Saturday, Jan. 7, 1860:—

J. R., of N. Y., $55; P. C. Y., of N. Y., $30; C. & Z. W., of N. J., $25; J. H. M., of Cal., $35; W. H. P., of Ind., $30; W. W. G., of Ill., $30; N. C. S., of Conn., $95; F. & S., of N. Y., $30; C. B., of Ohio, $25; W. L. F., of N. J., $30; P. C. C., Jr., of N. H., $10; A. F., of N. J., $25; G. B. C., of N. Y., $35; N. J. H., of N. Y., $30; A. F., of N. Y., $12; K. & S., of N. Y., $30; O. H., of N. Y., $25; W. D. A., of N. Y., $40; I. G., of Ga., $25; J. H., of R. I., $60; J. C., of Maine, $25; G. P., of Pa., $30; G. & McC., of Ohio, $30; G. K., of N. Y., $30; H. K., of Ill., $25; J. G., of Ga., $30; D. & S., of N. Y., $106; L. A. B., of N. Y., $20; W. M., of N. Y., $25; G. M. B., of N. Y., $25; G. A. W., of N. Y., $25; T. L., of Ill., $25; G. C., of Ill., $25; I. S. S., of Pa., $25; W. S., of Pa., $60; G. G., of Oregon, $25; R. C. H., of N. J., $25; T. I. G., of Mass., $30; H. & J., of Ohio, $25; S. A., Jr., of N. Y., $30; L. F., of Mass., $25; W. W. P., Jr., of N. Y., $20; E. E. H., of Iowa, $30; C. S., of Conn., $28; E. H., of N. Y., $25; E. P. & J. N. F., of N. Y., $25; J. Van B., of N. Y., $25.

Specifications, drawings and models belonging to parties with the following initials have been forwarded to the Patent Office during the week ending Saturday, Jan. 7, 1860:—

I. G., of Ga.; G. G., of Oregon; C. B., of Ohio; E. P., of Conn.; A. F., of N. Y.; C. B., of Mass.; P. C. C., Jr., of N. H.; A. F., of N. J.; J. Van B., of N. Y.; J. S. S., of Pa.; S. & K., of Ill.; J. C., of Maine; G. M. B., of N. Y.; H. M. P., of Mo.; L. F., of Mass.; K. & S., of N. Y.; Z. W., of N. J.; G. K., of N. Y.; H. & J., of Ohio; W. M., of N. Y.; E. P. & J. N. F., of N. Y.; C. M. P., of N. J.; G. A. W., of N. Y.; G. C., of Ill.; J. R., of N. Y.; R. C. H., of N. J.; E. H., of N. Y.

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Rates of Advertising.

THIRTY CENTS per line for each and every insertion, payable in advance. To enable all to understand how to calculate the amount they must send when they wish advertisements published, we will explain that ten words average one line. Engravings will not be admitted into our advertising columns; and, as heretofore, the publishers reserve to themselves the right to reject any advertisement sent for publication.

PORTER'S CENTRIFUGAL GOVERNOR.—PATented July 13, 1858; re-issued June 21, 1859.

Auburn, Dec. 9, 1859.

The engine at our Agricultural Works, in the Auburn State Prison, has been regulated during the past year by one of Porter's Patent Governors, operating a throttle valve. Its action is remarkable, being exceedingly sensitive, without the least tendency to oscillate. We cannot tell in the engine room when any machinery is thrown on or off, except by the governor changing its position, affected, as we suppose, by changes in the speed, but these are too small to be discovered. This governor is very valuable for our business, in which the load on the engine varies exceedingly, and uniform motion is very necessary.

ROSS, DODGE & POMEROY.

A new testimonial will appear in this place each week. Every governor is warranted to maintain a speed so nearly uniform that the eye cannot detect any variation. Orders promptly supplied; valves furnished. A liberal discount allowed to agents and to engine builders. Send for a circular.

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WOODWORTH PLANING MACHINES, SASH Molding, Tenoning and Mortising Machines, &c., for sale at low prices, at machinery depot, No. 135 North Third-street, Philadelphia, Pa. CHAS. H. SMITH.
2 6

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J. H. ATWATER, INTRODUCTORY AND PATENT AGENT, Providence, R. I.—Patentees, manufacturers, also enterprising persons, desiring to learn particulars of profitable agencies without risk, may address (with stamp) as above. 1*

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FOR SALE—NEWMAN'S PATENTED BEAN Harvester. A new and valuable invention, operated with horse power, and self-adjusting. It gathers the beans in rows on the ground and removes stones and all obstacles. For rights of States, counties or territories, apply to SOUTHWICK & MARTIN, No. 61 Chamber-street, New York. 1*

EXCELSIOR BURR STONE FARM AND PLANtation Mill.—Agency, No. 45 Gold-street, New York. This mill has taken premiums at the late State Fairs, and won golden opinions from those using it in the different States of the Union. It is worth double the money asked for it, and warranted to give satisfaction to the purchaser. For hulling buckwheat, nothing has ever been discovered equal to it; for grinding middlings, it is superior to any mill in use. Circulars sent from this agency by J. A. BENNET. 3 4*

SALESMAN WANTED.—ONE WHO UNDERstands Cotton and Woolen Machinery may hear of a good situation by addressing S. W. H., at the office of this paper. 3 2*

ARCHITECTS' AND MECHANICS' JOURNAL. —"Altogether the best work of the kind ever published in our city."—SCIENTIFIC AMERICAN. $2 per year; weekly and illustrated. Publisher, A. HARTHILL, No. 128 Fulton-street, New York. 3 1*

THE SOUTHERN RURAL GENTLEMAN, VOL. III., for 1860.—The most popular and reliable agricultural and fireside weekly published in the South. Published every Saturday morning by I. L. Davis, Grenada, Miss. Every Southern planter should have it by all means; every agriculturist in the North should take it, that he may see the course of Southern agriculture, and, withal, cultivate that genuine agricultural feeling which should pervade every class of American ruralists. A circulation of at least, 100,000 is wanted for the SOUTHERN RURAL GENTLEMAN in 1860. Terms—Single copy, $2.50; three copies, $6; ten copies, $18; twenty copies, $32; thirty copies, $45. N. B.—The proprietor will also act as an agent for those who wish to introduce reliable agricultural implements, books, manures, seeds, &c. Address I. L. DAVIS, Grenada, Miss. 3 1

STEAM ENGINE FOR SALE.—HORIZONTAL, five-feet stroke, fifteen-inch cylinder, 50 horse-power, upright boiler; adapted to wood fuel; but little used. Will be sold on very moderate terms for cash or approved paper. For particulars address E. N. LESLIE, Skaneateles, N. Y. 1 4*

MACHINERY.—S. C. HILLS, NO. 12 PLATT, streets, New York, dealer in Steam-engines, Boilers, Planers, Lathes, Chucks, Drills, Pumps; Mortising, Tenoning and Sash Machines, Woodworth's and Daniel's Planers, Dick's Punches, Presses and Shears; Cob and Corn Mills; Harrison's Grist Mills; Johnson's Shingle Mills; Belting, Oil, &c. 2 e3w

JUST PUBLISHED.—ENGINEERING PRECEDENTS for STEAM MACHINERY. By B. F. ISHERWOOD, Chief Engineer of United States Navy. Vol. I., Screw propellers, &c., illustrated, $1.25; Vol. II., Boilers, &c., with seven plates, $2.50. BAILLIERE BROTHERS, Publishers, No. 440 Broadway, New York. 3*eow

BOILER PLATE PUNCHES.—RUST'S PATENT, manufactured and sold by the proprietor of the patent, S. C. HILLS, No. 12 Platt-street, New York. Price $150. 15 5

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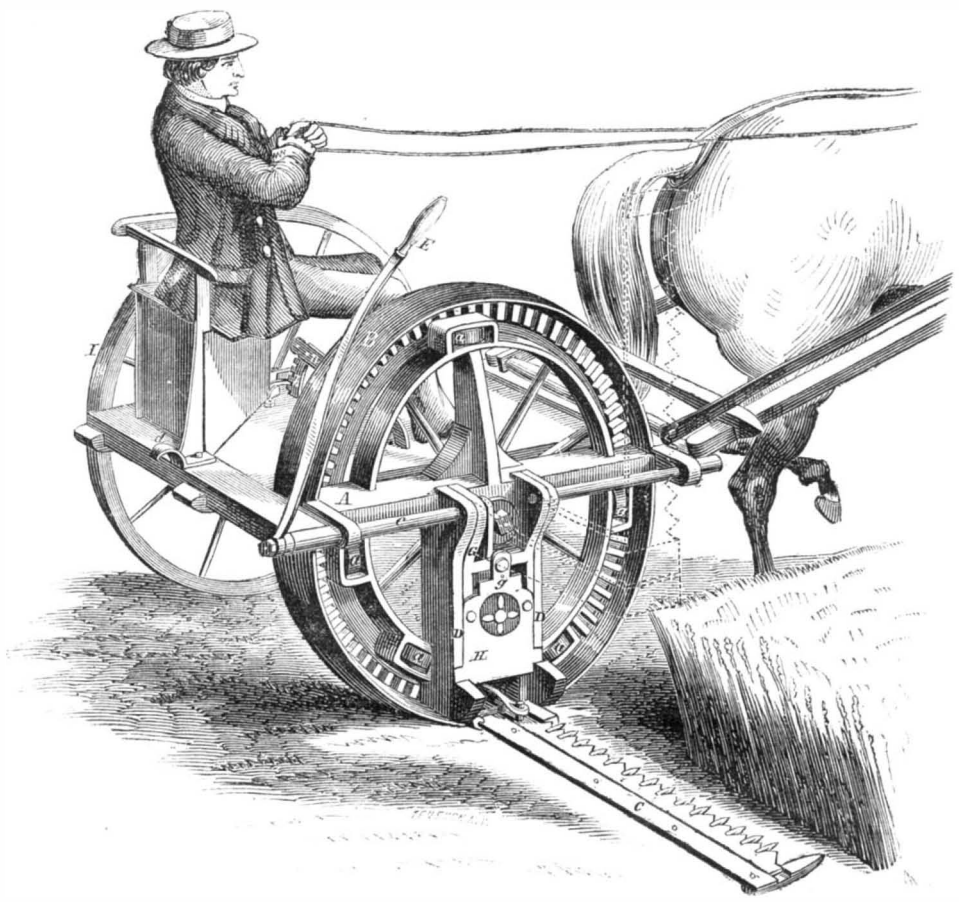
IMPROVED HARVESTER.

The accompanying illustration represents a mowing machine or harvester in which the several arrangements for imparting motion to the cutter, for adjusting its hight, and for turning it out of the way when not in use, are of an entirely novel character. It belongs to that class of machines which have vibratory cutters, and will be readily understood by examining the cut.

The circular frame-work, A, which supports the cutter

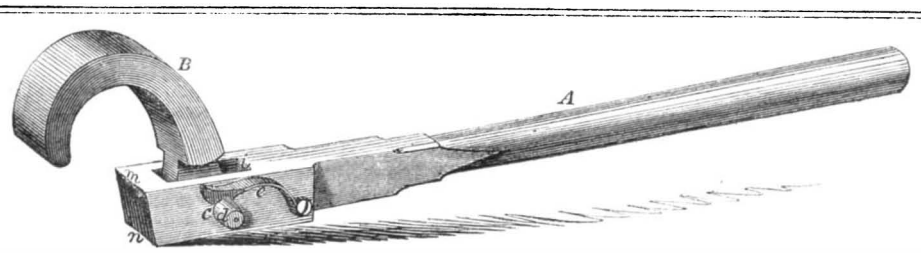


LUTHER'S IMPROVED HARVESTER.

with its driving parts, is secured to the end of the axle outside the driving wheel, B, friction rollers, *a a a a*, being interposed to allow the wheel, B, to revolve easily inside the frame, A. Motion is imparted to the vibrating cutter, C, by means of a small pinion which meshes into the gear on the driving wheel, the shaft of the pinion having a crank which works the small rod, *c*. The cutter is attached to the frame, G, which is hinged upon a rod at the top, and may be turned up into the position shown by the dotted lines, by bringing down the lever, E, under the catch, *d*, and thus removed out of the way of obstructions when the machine is being taken to and from the field. When the frame, G, is dropped back into place, between the two uprights, D D, of the circular frame, A, it is held in place by the latch, H; in turning the frame, G, up, this latch is lifted out of its catch by means of an arm, *r*, on the end of the rod, *e*, which is bent back and presses one end of an elbowed lever, the other end of which passes loosely through the latch, at *g*.

The axle of the carriage is made in two pieces, the piece, *n*, which has the driving wheel and frame, A, at its end, being bent so as to pass up through a slot in the floor of the carriage, and having the curved rack, *h*, attached to its opposite end. This piece of the axle is joined by a hinge near the wheel, B, to the end of that piece of the axle which carries the wheel, I, at its opposite end. The rack, *h*, is held in place by a spring catch, and may be raised or lowered at pleasure, thus inclining the frame, A, and cutter, C, to adjust the latter to cut the grain or grass at such hight as may be desired. This adjustment is easily accessible to the driver as he sits in the seat, L.

The patent for this invention was obtained through the Scientific American Patent Agency, June 7, 1859, and any further information may be obtained by addressing the inventor, H. H. Luther, at Warren, R. I.



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The metal bar, A, has the hook or claw, B, secured in the slot, *i*, by means of the pin, *d*. This pin has a groove, *c*, around its projecting end, in which groove the spring, *e*, fits so as to hold the pin in place. The pipe is grasped between the edge, *m*, of the end of the bar, and the curved end of the hook. The end of the bar is inclined at a small angle from a right angle, so that when the hook is placed in the slot on the opposite side of the bar, the distance from *n* to the end of the hook will be less than the distance from *m* to the end of the hook, and thus the implement will be adapted to grasp a cylinder of smaller size. Several hooks of various sizes are furnished with each bar; and the peculiar arrangement of the pin, *d*, and spring, *e*, renders the changing of the hooks a very quick and easy operation.

The patent for this invention was secured through the Scientific American Patent Agency, Dec. 20, 1859, and persons desiring further information in relation to it may address the inventor, George Smith, No. 169 (in the rear) East Twenty-sixth street, this city.

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Consultation may be had with the firm, between NINE and FOUR o'clock, daily, at their PRINCIPAL OFFICE, No. 37 PARK ROW, NEW YORK. We have also established a BRANCH OFFICE in the CITY OF WASHINGTON, on the CORNER OF F AND SEVENTH-STREETS, opposite the United States Patent Office. This office is under the general superintendence of one of the firm, and is in daily communication with the Principal Office in New York, and personal attention will be given at the Patent Office to all such cases as may require it. Inventors and others who may visit Washington, having business at the Patent Office, are cordially invited to call at their office.

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CHAS. MASON.

Immediately after the appointment of Mr. Holt to the office of Postmaster-General of the United States, he addressed to us the subjoined very gratifying testimonial:—

Messrs. MUNN & Co.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you discharged your duties as Solicitors of Patents while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and, I doubt not, justly deserved) the reputation of energy, marked ability, and uncompromising fidelity in performing your professional engagements. Very respectfully,

Your obedient servant, J. HOLT.

Communications and remittances should be addressed to

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